THE QUALITY SCHOOLS MODEL OF EDUCATION REFORM: A DESCRIPTION OF KNOWLEDGE MANAGEMENT BELIEFS AND PRACTICES USING BALDRIGE IN EDUCATION CRITERIA

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By

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ABSTRACT

This study used a concurrent nested mixed-methods approach to analyze the implementation of the Quality Schools Model of education reform through the lens of the seven Malcolm Baldrige Education criteria. Specifically, this study was an inquiry to determine the difference in beliefs and implementation related to knowledge constructs between and within groups of school staff based on professional role, years of education experience and years of experience working in the Quality Schools Model district. This research also used structural equation modeling to examine the fit between the Baldrige in Education theoretical model and actual practice of the Baldrige concepts in the context of rural Alaska school districts implementing the Quality Schools Model of comprehensive education reform.

A 72-item questionnaire was used to measure beliefs about importance of concepts and perceptions of the concepts in practice. The questionnaire was administered to a convenience sample of 212 administrators, teachers, and classified staff in three rural Alaska school districts. Qualitative data was gathered through 14 semi-structured interviews with community members, elders, school board members, parents, and school staff.

Results from the questionnaire data showed that job classification was the greatest predictor of mean responses. Administrators perceived knowledge activities were in practice to a greater degree than teachers. There were no significant differences in beliefs about importance or practice among participants based on years

of education work experience or on experience in the current school district. The results showed ambivalence and sticky transfer in the street-level implementation of the QSM with significant large differences between belief and practice scores for all groups.

A structural model of Baldrige in Education factors with leadership as the exogenous factor was created for the QSM. Results showed that leadership had a direct effect on knowledge management, and knowledge management had a direct effect on strategic planning, and an indirect effect on process management and the outcome variables of student, stakeholder and market focus, and results. There was no direct or indirect path between the knowledge factor and staff focus factor, leading to a recommendation to increase knowledge creation and sharing opportunities for that group.

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PREFACE

This dissertation is one of four to study the implementation of the Quality Schools Model in rural schools in Alaska. I was a member of a cohort of four doctoral students with a common interest in studying education reform in Alaska. Many researchers have found that cohorts improve the retention rates of students in professional doctoral programs (Brien, 1992; Cesari, 1990; Dorn & Papalewis, 1997; W. D. Miller, 2000; Tinto, 1988; Wesson, Holman, Holman, & Cox, 1996). A doctoral cohort may include common coursework, seminars for support during the dissertation phase, and/or a shared cohort of faculty. Our cohort shared a common core of coursework, collected a common body of research data, and shared faculty and some dissertation committee members.

As a group we shared a common interest in an often-used education reform model in Alaska—the Quality Schools Model. Each member of our cohort studied the implementation of the Quality Schools Model from a unique perspective that is reflected in his or her dissertation. A cohort model has the added value of bringing multiple perspectives to bear on a problem and its solution, lending validity and reliability to the results. Eisner (1998) called consensual validation, "agreement among competent others that the description, interpretation, evaluation, and thematic of an education situation are right" (p. 112). Contrary to the statistical norm of reliability established through sameness, Eisner said that for the purpose of educational inquiry, reliability is not compromised by the different viewpoints of the

inquirers. The four cohort members and the subjects of their dissertations were as follows:

Robert Crumley—leadership within the Quality Schools Model,

Dale Cope—knowledge factors within the Quality Schools Model,

Steve Atwater—process management in the Quality Schools Model, and

Susan McCauley—staff focus in the Quality Schools Model

Creamer (2004) and Dorn and Papalewis (1997) wrote that it is helpful for cohort members in professional programs to share some common background experience. The four members of this cohort, two men and two women, were all midcareer professionals with educational administration experience. All of us had some professional and personal experiences in rural Alaska and were longtime residents of the state. Bob Crumley is superintendent of the Chugach School District; the staff in his district piloted the questionnaire created for this research. Steve Atwater was superintendent of the Lake and Peninsula School District at the time of the research. To avoid any actual or perceived influence on the questionnaire responses by the superintendent, all communication about the research to Lake and Peninsula staff was initiated by another cohort member.

A cohort acts to reaffirm a belief in success, and the cohort structure helps members minimize anxiety over time constraints and the need to prioritize work, family, and the doctoral program (W. D. Miller, 2000). Cohort members, each with their unique network, contribute to a larger pool of resources for the benefit of the group. Another benefit of cohorts is the variety of social/emotional strengths they

offer; group members are able to share the roles of innovator, energizer, and encourager (W. D. Miller, 2000).

Vygotsky (1988) said that learning is a profoundly social process that is dependent on dialogue and language. The social process of learning helps individuals internalize knowledge and fit it into or expand their mental models. Effective cohorts create a culture where differences of opinion are valued, are routine, and are open to discussion (Creamer, 2004). Creamer wrote, "What is instrumental to the outcomes of collaborative research, and how innovative it is, is the extent that collaborators engage in dialogue about different and sometimes contradictory explanations for the phenomenon under study" (p. 568). According to Salter and Hearn (1996), this critical discourse is at least as important as consensus in the process of knowledge creation. Further, critical discourse is most likely to contribute to knowledge creation and transfer when it occurs in the context of community (i.e., a cohort) where there is a commitment to a common goal and members share a sense of affiliation. Differences of opinion were common in our group and the act of achieving consensus at critical junctures helped each of grow and learn more about research methods in general and our subjects specifically.

Wesson et al. (1996) claimed that a cohort approach to learning is especially appropriate related to educational leadership:

> Since we know that educational administrators need to be critical thinkers engaged in active, reflective information processing, the more we can provide opportunities for this development in formal preparation programs, the better

> educational leaders will be prepared to facilitate this kind of transformation of all kinds of work groups. (p. 16)

According to Dorn and Papalewis (1997) and Wesson et al. (1996), cohorts develop a collective personality. Our cohort certainly took on a unique personality. We became a "living laboratory" as we internalized theory into practice related to the concepts we were studying: We looked for best practice in literature and research; we discussed our work as a community of practice; we shared leadership; and we developed processes related to leadership and knowledge management of our research. We demonstrated varying degrees of absorptive capacity for new concepts based on our personal mental models, and at times experienced stickiness in knowledge transfer. Our cohort functioned as a knowledge "mini-market" where knowledge was acquired, created, shared and transferred, and codified. In short, the experiences of this cohort support research findings about the benefit of cohort collaboration for doctoral program completion and best practices related to professional learning communities.

Our cohort worked together more than a year to develop and pilot a questionnaire that would represent the research interest of each person. We shared the deployment of the questionnaire and the task of interviewing participants as a way to reduce the number of requests made to individuals in the districts we studied. The data collected for this research was shared by all four students. The fourth research question – the design of a structural model to fit our data – was of interest to all of us and was developed collectively using the whole questionnaire data set. We collaborated on methodology and did some of the preliminary data cleaning and

analysis together though I chose some different statistics and more groupings to achieve the results of my study.

Some of the theoretical and research literature was of interest to all members of the cohort, namely historical information about education reform, the quality movement, and the Baldrige criteria. Our common coursework included studies in rural education, rural educational leadership, and cultural factors. We also studied management theory together. We have individually applied what we learned in our own writing. Each of us wrote our own chapters, with some cohort members sharing feedback from their committee members with the whole group. Agency and authorship are ascribed and disclosed in this research in this way: where decisions and work are mine exclusively, I have used the words "I" and "this researcher"; where the decision and/or work were common to the cohort, I have used the terms "we" and "the research cohort" or simply, "the cohort".

ACKNOWLEDGEMENTS

This work is dedicated to my late father, Stanley Nelson who always expected me to do my best in everything, and who shared the sentiment voiced by President Theodore Roosevelt in his 1903 Labor Day speech, "Far and away the best prize that life offers is the chance to work hard at work worth doing." This work is also dedicated to my beautiful granddaughter Mary Grace Acituq Cope whose educational opportunities and personal happiness are most important of all to me.

The early 20th century businesswoman Alice Foote MacDougall (1928) wrote that, "Much of the success of life depends upon keeping one's mind open to opportunity and seizing it when it comes." Those words seem especially appropriate here; the opportunity to participate in a cohort to complete my Ph.D. *and* to do so at the University of Alaska was certainly something I didn't expect four years ago. I owe a huge debt of gratitude to Dr. John Monahan for his work in helping me realize my educational goals and for encouraging me to keep going when my spirits were low. Dr. Monahan had the vision for a Ph.D. cohort and guided our group from start to finish along a path that had lots of twists and turns over three years. I am also appreciative to the University of Alaska Fairbanks for supporting the cohort Ph.D. opportunity. Completing a Ph.D. at UAF brings closure to my education in an especially satisfying way since I was born and raised in Alaska but completed my B.S. and M.Ed. "Outside".

To the many friends and family members who helped and supported me over the three years to complete this work, the words of Shakespeare's character Thaisa in the play *Pericles* (1609) seem appropriate:

My recompense is thanks, that's all,
Yet my good will is great, though the gift small.

I owe a huge thank you to my sister, Sue Nelson Suit who assisted our cohort in designing our online questionnaire when we couldn't find a commercial format to accommodate two response scales. Thank you to my mother, Darlene Nelson who once again refused to let me quit! And thank you to my son, Ryan Cope who, along with my mother and sister gamely read and commented on my drafts. Other friends who read parts of my manuscript and offered suggestions were Linda Goentzel, Cathy McGregor, and Patrice Icardi. Your suggestions were so good and you helped me to clarify some especially cumbersome passages.

Encouragement comes in many forms – someone who listens sympathetically, validates your feelings, offers suggestions, laughs with you, helps you see the silver lining in a cloud …these are the things my friends did for me during the last three years, without ever doubting my sanity for doing this research, at least to my face. Thank you to Monica Guthrie, Carol Glockner, Margaret Mills, Texas Gail Raymond, and the women of the Bear Bottom Riders, all accomplished in their own profession– thanks especially to Rowan Crader who called in my absence from one of our cohort classes after I fell from my horse!

Dr. David Porter was probably one of the best committee chairs ever. He understood when to allow me freedom to make mistakes and when to provide insight

and save me from myself. Dr. Porter's flexibility in teaching our cohort is likely unparalleled anywhere in education. I also thank my friend and committee member, Dr. Paul Johnson for the gentle advice and guidance through this process, nudging me to consider new sources, ideas and possibilities for inquiry. Though not a member of the committees for the other cohort members, Dr. Johnson committed time to ensure we all succeeded. What a gift! Likewise, Dr. Eric Madsen was not on my committee but often shared his comments and suggestions with all four cohort members. Dr. Madsen was receptive to and created some novel structures for our written and oral exams and for our defenses, balancing the requests of our cohort with university requirements. Last, I owe a thank you to my other committee members who patiently read my drafts and provided me with feedback, and to my cohort companions who taught me many valuable lessons about group process over the last three years.

In the words of the British novelist Samuel Richardson (1753), "What we want to tell, we wish our friends to have curiosity to hear." My fervent hope is that others will find my research on knowledge concepts within the Quality Schools Model interesting and worth the time to read.

CHAPTER ONE: INTRODUCTION

Overview

The topic of this dissertation is the implementation of the Quality Schools Model (QSM) of education reform in three rural Alaska school districts. This research is an analysis of individuals' perceptions about the importance of and the implementation of the QSM through the lens of one of the seven Malcolm Baldrige Education Criteria for Performance Excellence. Specifically, it is an inquiry to determine the difference in beliefs and implementation related to knowledge constructs between and within groups, and to form conclusions about the role of knowledge factors in the implementation of the QSM in rural Alaska school districts. Last, this research examines the fit between the Baldrige in Education theoretical model and actual practice in the context of rural Alaskan school districts implementing the Quality Schools model of comprehensive education reform. Knowledge-related activities are hypothesized to exist within all four of the components of the QSM, specifically the acquisition, generation, transfer, and codification of explicit knowledge.

The results of this mixed-methods study came from an analysis of quantitative data calculated from questionnaire responses from a sampling of the three districts' certified and classified staff members. Using a concurrent nested design, these data were then triangulated with qualitative data gathered through semi structured interviews of a criterion-based sample of staff and community members from two of the participant districts. Chapter 1 contains a formal statement of the problem, the

background for the study, a description of the three rural school districts that participated in the study, the research questions that guided this study, the theoretical framework for the methodology, and limitations of the research.

1.1 Statement of the Problem

This study describes the implementation of one education reform effort, the QSM, in three rural Alaskan school districts: Bering Strait School District, Lake and Peninsula School District, and Kuspuk School District. These districts were selected for this study because they had been involved in the reform effort for at least 4 years. The study considers implementation of the QSM through the lens of the Malcolm Baldrige Education Criteria for Performance Excellence, focusing on constructs related to knowledge management.

Rural Alaskan school districts have engaged in education reform initiatives encouraged by state level policy makers in response to the national standards movements as well as reform initiated at the local level by individual districts or schools. Similar to the path of educational reform nationwide over the past two decades, Alaskan reform efforts have sought to engage community members, business leaders, nonprofit organizations, and other stakeholders, and to leverage organizational quality concepts toward reform structures that are systemic and sustainable. However, C. Barnhardt (2001) characterized some of the reform efforts implemented for Alaska Native students as based

> solely on … short-term localized considerations, or research conclusions drawn from conditions outside of Alaska. This has been a theme throughout

> the history of reforms in the state, and it continues today as the state looks to the "Lower 48" for quick-fix solutions to long-standing schooling challenges. (p. 2)

Related to the failure of education reform in general to increase student achievement, Cuban (1990b) argued that reform efforts fail because the problems and the solutions are mismatched. He said,

> It is important to policy makers, practitioners, administrators, and researchers to understand why reforms return but seldom substantially alter the regularities of schooling. The risks involved with a lack of understanding include pursuing problems with mismatched solutions, spending energies needlessly, and accumulating despair ...We can do better by gathering data on particular reforms and tracing their life history in particular classrooms, schools, districts, and regions. More can be done by studying reforms in governance, school structures, curricula, and instruction over time to determine whether patterns exist. (p. 11)

Hill (2003) noted that policy and reform developers too often dismiss the influence of local environment in reform implementation, with a reminder that public service organizations do not exist in closed environments. Further, educational reform literature suggested that ad hoc, episodic school reform initiatives (Duffy, 2003) are rarely successful because they are not systemic in their approach and hence have little chance of being sustained (Fullan, 2001a, 2003; Sallis, 1993; Schlechty, 2001). In the case of Alaska's rural districts, it is likely that reform efforts have not brought the

desired changes for precisely these reasons: lack of sustainability and not appropriately tackling the most pressing reason for the problem.

Two important knowledge-related concepts may be useful for explaining the lack of success of education reform efforts: absorptive capacity and stickiness of transfer. Sticky transfer (Szulanski, 2003) can occur as implementers try to figure out what the policy or reform means in the first place, since there may not be enough text or information to determine the underlying intent of the designers. Implementers resolve the uncertainty of intent through an interpretive process that ultimately changes the policy or reform. Sticky transfer can also occur at the point where implementers try to discern what the policy or reform means to everyday practice (Hill, 2003). Within the QSM, Marzano (2005) provided an example of this in his description of the effects of standards record-keeping for teachers.

The implementation of a policy or reform can also become sticky or falter when implementers fail to recognize they lack the knowledge to implement faithfully (Hill, 2003); this is directly related to lack of absorptive capacity. Both individuals and organizations can impede implementation through lack of absorptive capacity. A school district may not develop absorptive capacity for new ideas if it is experiencing success with mediocre processes. "A competency trap can occur when favorable performance with an inferior procedure leads an organization to accumulate more experience with it, thus keeping experience with a superior procedure inadequate to make it rewarding to use" (Cohen & Levinthal, 1990, p. 322).

1.2 Background of the Study

In 1976, Alaska eliminated its state-operated school system and instead created a series of locally controlled, regional school districts. Twenty-three of the 52 school districts in Alaska are Regional Educational Attendance Areas (REAAs) that are locally controlled but spread over large geographic areas connected only by air, or sometimes by boat or snow machine. The majority of the REAAs serve Alaska Native students in rural communities and villages where "educational attainment is still well below that of non-Native Alaskans" (Institute of Social and Economic Research [ISER], 2005, p. 6-16). While dropout rates among all regions in Alaska were similar in 1992, by 2002 Alaskan regions with the highest Native enrollment had significantly higher dropout rates (ISER, p. 6-13). National Assessment of Educational Progress (NAEP) data from 1996 and 2003 show that non-Native students were about 3 times as likely as Alaska Native students to score "proficient" in math and reading in both fourth and eighth grades (ISER, p. 6-16). Data from the 2006 administration of the Alaska High School Graduation Qualifying Exam, on which students must score "proficient" in order to receive a high school diploma, show that while 74% of all 10th graders who took the reading portion passed, only 51% of Alaska Native students passed, compared to 86% of White students (ISER, p. 38).

Over the last 10 years, several of the state's rural districts have pursued reform by implementing the QSM, a systemic approach to educational change that originated in Alaska and is heavily influenced by recent waves of education reform theory and research. In the late 1990s, the Chugach School District, a small school district

primarily serving Alaska Native students in Prince William Sound, developed the standards-based QSM by combining best practices from education (e.g., differentiated instruction) with best practices from the world of business (e.g., continuous improvement). The model has since been replicated, in whole or in part, in 12 school districts throughout rural Alaska.

The QSM takes a systemic approach toward education, focused on four areas of a district's structure and operation: leadership, the shared vision of the district's stakeholders, standards-based design (the core technology of teaching and learning), and continuous improvement. A move to a less bureaucratic organizational structure is an integral part of the QSM and is consistent with "middle-up-down" management for knowledge creation described by Nonaka (1994). The QSM has also been significantly influenced by the quality movement, often referred to as Total Quality Management (TQM). Additionally, the QSM addresses most of what Chudowsky, Kober, Gayler, and Hamilton (2002) described as the necessary pieces of education reform: the use of quality standards in multiple content areas, well-designed assessments, accountability and professional development, help for students, better information, clearer policies, and monitoring impacts. Marzano (2005, p. 43) concluded that "to one degree or another, the Quality Schools Model appears to address a majority" of the 11 criteria of the Comprehensive School Reform Program, a federally funded initiative aimed at encouraging schools to adopt proven comprehensive reform models.

In addition to the structural features of the QSM, there are instructional design facets of the model that separate it from other reform efforts. The foremost of these is

that time is considered variable when determining student advancement. As such, there is an increased focus on the individual and an elimination of grades or age grouping of pupils. Students can only advance when proficient; the end of a semester has no bearing on this. Students do not earn Carnegie units that are based on a fixed amount of seat time; instead, they demonstrate proficiency or mastery of concepts to progress from one level to the next. A second difference is the inclusion of areas such as personal social health, service learning, and cultural awareness within the routine curriculum. These content areas, which are often left to student choice through electives, are required curriculum for students in QSM districts.

The Quality Schools Model of education reform is an example of what Sallis (1996) defined as transformational quality, a refocusing of the organization on quality services and customer needs. With this in mind, the Malcolm Baldrige Quality Program Education Criteria for Performance Excellence were selected for this research as the tool for examining the implementation of the QSM in the three selected rural Alaska districts. The Malcolm Baldrige Education Criteria for Performance Excellence is a public–private sector partnership whose mission is to improve the performance of U.S. organizations. The award, named after the 26th U.S. Secretary of Commerce, came into existence in 1987. Twelve years later, President Clinton expanded the Criteria to include health care and education. Education organizations now use the seven education criteria (Leadership; Strategic Planning; Student, Stakeholder, and Market Focus; Measurement Analysis and Knowledge Management; Faculty and Staff Focus; Process Management; and Results) as a diagnostic tool to

identify strengths and opportunities for improvement (National Institute of Standards and Technology [NIST], 2006). Because the criteria focus on organizational performance, they can be used to apply a systems perspective to a school district. The Baldrige in Education criteria have been used by other researchers to examine the importance of various education reform initiatives because the criteria focus on observable processes and outcomes that should be evident as indicators of success within any education reform. The table in Appendix A details the seven Baldrige categories and their associated point values.

Academic standards became a major part of the education landscape soon after the release of the 1983 report *A Nation at Risk* (Ravitch, 1996), which launched a wave of education reform based in part on measurable standards. The standards movement has since been engulfed by the accountability measures of No Child Left Behind (NCLB). Initially, the NCLB accountability movement led districts to adopt programs or quick remedies that more often than not resulted in frustration for students and school staff because of the lack of sustained improvements (Dale, 2003).

Gradually, there has been a move away from programmatic changes to efforts that are more systemic in nature. At the national level, this change was seen with the federal support of the Comprehensive School Reform (CSR) Initiative. Federal inclusion of CSR criteria with NCLB language provided recognition that simply adopting the latest program was insufficient to effect long-term change. Inclusion of the CSR criteria within NCLB was important because it acknowledged the accumulating research base on effective schools. Literature on systemic reform in

education (Fullan, 2001a, 2003; Levine, 2005) confirmed that schools are increasingly looking to examine themselves holistically and then make the appropriate improvements. As does the QSM, many of these systemic reform efforts glean best practices from the business world, in particular the theory of TQM that was advanced by Deming (2000) and Juran and Godfrey (1999) following World War II. Briefly, TQM can be viewed as a "philosophy and a methodology that assists organizations to make change, and to set their own agendas for dealing with the plethora of new external pressures" (Sallis, 1993, p. 3).

The issue of whether business practices can be applied to education has been debated for decades. There have always been skeptics who state that because education is an open system—schools are considered in this way because they are not autonomous due to the variables that are not subject to their complete control (Thompson, 2003)—the application of business theory to education is inherently flawed. Furthermore, the imprecise definition in education of the terms *product* and *customer* causes many who try to apply a business approach to schooling to struggle (Poston, 1997). This quandary can be extended to the concept of coproduction. Coproduction defines the variables that affect the end product. Such a definition in business (manufacturing cars, for example) is more straightforward than in education, where the inputs from all the variables (e.g., parental involvement in a child's schooling) are not as well defined or controllable (Porter, 2007). Education critics argue that schools—unlike businesses—are "typified by an absence of measurable goals, loose coupling, little direct connection between acquired resources and

products, an ability to ignore major constituencies, and … a tradition of resistance to assessments of effectiveness" (Cameron, 1986, p. 88). On the other hand, while it is true that the open system of education does not perfectly mesh with the closed-system practices of business, the move by educational organizations to glean what is applicable from closed-systems theory—the focus on those variables that are positively associated with its goal achievement—has helped to counter the limiting factors (i.e., the organizational interdependence with the environment of the open system).

Another important consideration when reviewing how business theory relates to the QSM is the concept of the multiple-division organization that is used by many large corporations (Porter, 2006). In a multiple-division organization, design activities are divisible into relatively independent bundles of activity. The central guidance group is supported by an analytical staff that has the power to discipline the actions of the various groups. The summary statistics allow interdivisional comparisons for purposes of evaluating the performance of a division (Chandler, 1962). In the QSM, this approach toward organization management is central to continuous improvement. While the multiple-division design is not new to business, it has been only recently that school districts have begun to organize in this way. The aforementioned attention to the organizational structure and best practices from business and other public systems is a strong feature of the QSM. This closer alignment with organizational characteristics normally found in business makes the QSM distinct from other reform efforts that the districts in this study have pursued.

Examination of knowledge management beliefs and practices seems important to understanding how school districts have implemented the QSM of education reform. Eisner (1998) stated that "to understand what goes on in schools and classrooms requires sensitivity to how something is said and done, not only to what is said and done. Indeed, the what may very well depend on the how" (p. 19). This dissertation uses the Malcolm Baldrige Award criteria for performance excellence in education as a way to look at knowledge management and its role in the implementation of the QSM.

Knowledge possesses some paradoxical characteristics that make it different from other organizational assets or resources, according to Dalkir (2005). First, knowledge is never "used up." Second, transferring knowledge does not result in losing it. Also, the amount of knowledge may be abundant while the ability to use it is scarcer. Finally, much of an organization's most valuable knowledge goes home at the end of the work day. In addition, a number of knowledge management experts (Choo, 1998; Nonaka & Takeuchi, 1995; Senge et al., 2000; Szulanski, 2003) point out that both individuals and organizations have mental models that exert a great deal of influence on the creation of tacit and explicit knowledge and its use and transfer.

Continuous improvement, one of the components of QSM, is an iterative process involving all the elements of the knowledge cycle, including deep reflection—what Argyris and Schön (1978) and Senge et al. (2000) called "double-loop learning." It takes multiple types of data and information to form the basis of knowledge and high-quality decision making leading to educational excellence. The analysis of data

and information creates meaning and provides a basis for decision making, planning, and improvement. Performance and process data are both important, as is the relationship of the information collected to the organization's needs and shared vision. The Baldrige program refers to this mix of data and information as a "balanced scorecard." A balanced scorecard for organizational decision making includes information about outcomes or results (performance) as well as information about the effectiveness and management of organizational processes. Bernhardt (2000) emphasized the importance of finding the intersections between various types of data for creating meaning and understanding. Other important factors in the efficacy of knowledge management relate to the organizational structure for effective collection, use, and communication of knowledge, the politics of knowledge (who has it, who gets it, how, and why), the cultural component of knowledge, and the technology and infrastructure for knowledge management.

Within education there is a responsibility for communicating and sharing knowledge to create a vibrant learning community. Szulanski (2003) defined two types of knowledge transfer activity. One is vertical across differentiated groups, such as transfer from a university to a school district or from research into practice. The second type of knowledge transfer is horizontal from one organization to a similar organization. It is characterized by recreating practices effectively in different geographic locales and assumes the existence of a working example or template that can be transferred. The implementation of the QSM is an example of the second type of knowledge transfer.

Two important knowledge concepts that could appear during implementation of any initiative such as the QSM are stickiness of transfer and absorptive capacity. Absorptive capacity refers to individual or organizational openness to change and innovation and the capability or preparedness for being able to integrate the change (Cohen & Levinthal, 1990; Dalkir, 2005; Szulanski, 2003). "Cognitive research on individual learning suggests that the accumulation and richness of preexisting knowledge increases the ability to put new knowledge into memory as well as the ability to recall and use it" (Choo, 1998, p. 149). Practically speaking, a knowledge recipient that lacks absorptive capacity will be less likely to recognize the value of new knowledge and less likely to apply it successfully (Szulanski, 2003). Dalkir summarized the effect of low absorptive capacity on an organization by saying, "If an organization's absorptive capacity is low, it will be very difficult to carry out significant cultural changes" (p. 212).

Knowledge transfer "stickiness" was the term used by Szulanski (2003) to describe factors that could cause ineffective knowledge transfer. Stickiness may be due to attributes of the knowledge itself, such as newness or tacitness. Knowledge transfer—in this case, recreation of the QSM—may also be sticky due to causal ambiguity or incomplete understanding of the exemplar being reproduced. Szulanski found that there were two key considerations related to successful knowledge transfer. The first was the motivation of the recipient to absorb knowledge from outside the organization. With an important exception, organizations that self-assessed themselves the most favorably were less likely to accept practices from like organizations. The

exception was organizations that viewed themselves as the best. Those organizations had little reticence in seeking or accepting external best practices (Collins, 2001). The second consideration affecting the degree of stickiness in implementation of knowledge generated outside the organization, according to Szulanski's research, was the extent of management intervention. Szulanski found that initiatives that were either strongly suggested or else entirely spontaneous in the organization had the least difficulty in implementation. The most difficulty was encountered when the implementation was mandated, simply favored by, or deemed optional by management.

By their nature, the Measurement, Analysis, and Knowledge Management (MAKM) criteria are interrelated with all of the other Baldrige criteria, and knowledge related activity is embedded in all four areas of the QSM: Leaders direct the collection of data and information and its transformation into knowledge; faculty and staff use both formative and summative results data on a daily basis; the creation, acquisition, transfer, and codification of knowledge are critical for establishing shared vision, for strategic planning, and for continuous improvement; and a robust knowledge system is essential for ongoing process management. Student and other stakeholder satisfaction and results are all assessed by gathering and examining information. Study of the relationship between knowledge management beliefs and practices related to implementation of the four components of the QSM may yield important information and knowledge for districts implementing comprehensive school reform using the QSM.

1.3 Description of the Three Districts

The Bering Strait School District (BSSD) is a Rural Education Attendance Area (REAA) located on the west coast of Alaska. The district serves 15 widespread and diverse villages and has a total enrollment of approximately 1,700 students. The area includes villages on the Seward Peninsula and Norton Sound as well as on St. Lawrence and Little Diomede Islands. The distance between the furthest two schools in the district is approximately 350 miles. Travel between the villages in the district is almost entirely by air. Many children in the communities of Gambell, Savoonga, and Diomede speak Siberian Yup'ik as their primary language. The largest school, Savoonga, is located on St. Lawrence Island and has 219 students and 21 certified staff members. Overall, the district has 174 classroom teachers, 15 principals, and 5 assistant principals. At the district office, there are seven certified support positions, four directors, five coordinators, and the superintendent. Nearly 100% of the students are Alaska Native, and over 80% of the district is limited English proficient. Eighty-six percent of the students are eligible for free or reduced lunch. The school district is governed by an 11-member school board. The BSSD began its implementation of the QSM in 2002, when the school board and administrators characterized student achievement as acceptable but not stellar. A chronicle of the history of QSM implementation on the district Web site says,

> There can be little debate that the first 25 years of the school district were the most successful if for only one reason: for the first time ever, students could stay at home and go all the way through high school. That said, the leadership

> of the District and the School Board began talking out loud about what we had sensed for some time: while we were doing okay, we were not doing nearly as well as we could and should have been doing. Our students were passive recipients in a process and product that varied greatly from one site to another and even from one year to another at the same site. Our relationships with our communities were largely neutral, with few strong feelings one way or another. It would have been relatively easy to continue doing what we had always done: the reality, however, was that we were no longer willing to accept the results those efforts had always produced. (BSSD, 2008)

Other reasons given for selecting the QSM as a reform model were its alignment with the Alaska Quality Schools Initiative; the standards-based instructional design; success of the QSM in another rural district in Alaska (Chugach School District); the systemic nature of the model, which was seen as a plus in light of constant staff turnover; and the availability of implementation funds through the Reinventing Schools Coalition.

The QSM is called the BSSD Instructional Model in Bering Strait, to recognize the uniqueness of the QSM implementation in the district. After 5 years, the district stated that its implementation of the model had resulted in increased student achievement in core content areas; expanded, coordinated staff development in all district programs; a flatter leadership structure conducive to reform; widely adopted tools for collaborative work over distance; reduced dependence on proprietary curriculum materials and vendor-driven programs; organizational commitment to collecting and using data for decision-making; dramatically reduced teacher turnover

rates; and significantly improved ability to recruit and retain high-quality educators (BSSD, 2008).

The Kuspuk School District is an REAA with 10 schools in eight villages serving approximately 414 students. The district is located in western Alaska along the Kuskokwim River between the villages of Stony River and Kalskag. Transportation between villages is by air or boat. In the winter, the frozen Kuskokwim River becomes an ice road for snow machine and vehicle travel. The district covers over 12,000 square miles. The school district offices are located in Aniak, which is about 320 air miles west of Anchorage. The regional economy is based primarily on subsistence fishing, hunting, and gathering. Most of the district's population is Yup'ik or Athabascan. Most students have limited English proficiency (90%) and are low income (80%). Kuspuk School District started its implementation of the QSM in 2003.

The Lake and Peninsula Borough School District serves 380 students in 14 village K–12 schools. The district's 14 schools are staffed by 42 classroom teachers for a pupil-to-teacher ratio of 9:1. The district's roster of certificated staff also includes four special education teachers, three specialists, five principals, and four district-level administers. The district is located on the Alaska Peninsula and is roughly the size of West Virginia. Ninety percent of the district's students are Alaska Native (Alutiiq, Athabascan, and Yup'ik), and about 70% of these students are eligible for free or reduced lunch. The district is governed by a seven-member board with three members from the south's seven villages, three from the seven north area villages, and one member at large. Many of the communities in this district are along the southwest

coast of Alaska. The economy of the region is based on commercial fishing, with increased mining activity in the last several years.

Lake and Peninsula School District started its implementation of the QSM in 2000 with community meetings to assure the public that the model was aligned with the district strategic plan and school board approval to adopt the model. There was a change of district leadership in 2001. District revision of student standards and assessments, professional development for staff, and revision of the shared vision have occurred on a routine basis. A district self-assessment using Baldrige in Education Criteria was conducted in spring 2007. Staff turnover has been cited by district leadership as an impediment to change.

Since the introduction of the QSM in each of the three districts in this study, there has been a change of superintendent. Additionally, as shown in Figure 1.1, teacher turnover ranged between 20% and 43% from 1999 to 2007. As noted earlier, a high rate of turnover can negatively impact all of the knowledge functions of an organization.

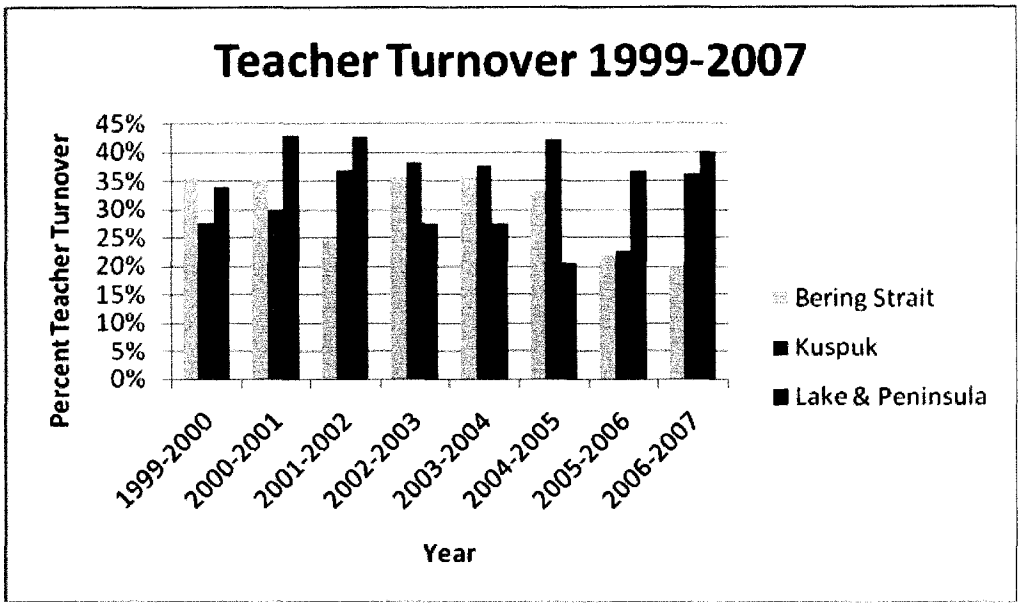

Figure 1.1: Teacher Turnover in Bering Strait, Kuspuk, and Lake and Peninsula School Districts, 1999–2007

Data source: Institute of Social and Economic Research, University of Alaska Anchorage

1.4 Research Questions

The purpose of this research was to examine the perception of the importance and existence of QSM implementation concepts by surveying administrators, teachers, and classified staff working and living within three rural Alaska school districts. The voice of community members was captured through semi structured interviews. Specifically, the purpose of the research was to explore knowledge management beliefs and practices and to formulate some conclusions that might be useful to other school districts implementing the QSM or that future researchers might find useful. Baldrige in Education constructs were used to describe the QSM implementation features.

This study had four research questions:

Question 1: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs, *to be important* within the Quality Schools Model of education reform?

Hypothesis 1.1: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between administrators, teachers, and classified staff.

Hypothesis 1.2: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between teachers based on years of education experience and based on years of experience in the QSM district.

Hypothesis 1.3: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between participants based on years of education experience and based on years of experience in the QSM district.

Question 2: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs, *to be in practice* within the Quality Schools Model of education reform?

Hypothesis 2.1: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between administrators, teachers, and classified staff.

Hypothesis 2.2: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between teachers based on years of education experience and based on years of experience in the QSM district.

Hypothesis 2.3: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between participants based on years of education experience and based on years of experience in the QSM district.

Question 3: Are there statistically significant differences in participants' belief scale mean scores and practice scale mean scores for knowledge factors, and are those differences statistically significant between groups?

Question 4: What are the relationships among the Baldrige in Education Criteria that describe the Quality Schools Model?

Hypothesis: Knowledge Management has either a direct or indirect effect on all other Baldrige criteria as shown in the Baldrige theoretical model.

1.5 Significance of the Study

This research has professional significance for four reasons. First, no one is in the knowledge business like schools, where teaching and learning are the core technology. Knowledge creation and transfer take time and incur costs, and success is never guaranteed. O'Dell and Grayson (1998) provided four reasons for believing that

knowledge management is more than just a fad. First, it is built on the power of learning, which has never gone out of date. Second, knowledge management is practical and action oriented, not ideological and theoretical. Successful knowledge management has a positive effect on organizational results. Third, knowledge management recognizes the source of knowledge as individuals. While technology can certainly facilitate the collection, storage, and sharing of knowledge, knowledge management itself is not totally reliant on technology like some process-improvement methods. Last, knowledge management is consistent with decentralized organizations and project-team models of organizational design. Successful knowledge management enables these organizational structures. Dalkir (2005, p. 20) summarized the benefits of knowledge management for individuals, communities of practice, and organizations, as shown in Table 1.2.

Table 1.1 Benefits of Knowledge Management

For individuals, KM	For the community of practice, KM	For the organization, KM
Helps people do their jobs and save time through better decision making and problem solving	Develops professional skills	Helps drive organizational planning and strategy
Builds a sense of community within the organization	Promotes peer-to-peer mentoring	Solves problems quickly
Helps people keep up to date	Facilitates more effective networking and collaboration	Diffuses best practices
Provides challenges and opportunities to contribute	Develops a professional code of ethics that members can follow	Improves knowledge embedded in services
	Develops a common language	Cross-fertilizes ideas and increases opportunities for innovation Builds organizational memory

The second reason this research is significant is that there is an absence of empirical data on rural Alaska districts implementing the QSM. In the past 6 years, a number of Alaska school districts have adopted and then abandoned the QSM. Currently, six school districts are at some stage of implementation of the QSM. At the time of this writing, only a small amount of any research is available on the QSM. An early study by Jester (2001) was a case study of the development of the reform model in Chugach School District. Jester was critical of the QSM and concluded that Chugach administrators and teachers developed and perpetuated an "unhealthy Native construct" (p. 29) for the purpose of indoctrinating Alaska Native students into the dominant White culture. Jester raised considerations about transferability of the model to other school districts. Reagle (2007) sought to address criticisms leveled by Jester against the QSM and to utilize research methods that were inclusive of an Alaska Native voice. Reagle studied the involvement of the community ("community voice") of the primarily Alaska Native population during the implementation of the QSM in Bering Strait School District, one of the same districts participating in this research. Reagle concluded that in the Bering Strait district, QSM implementation resulted in greater participation in the district processes by all stakeholder groups and the creation of a sustained shared vision. Marzano (2005) studied the design of the teaching and learning component of the QSM and declared the QSM perhaps the best standards-based education reform initiative so far. Another study done by Coladarci, Smith, and Whiteley (2005) found a correlation between the implementation of the QSM components and increased student achievement, though Coladarci et al. stopped short

of saying the relationship was causal, based on their results. A related study by McKinney (2003) looked at the readiness of Alaska school districts to implement change, specifically standards-based education. Her results showed that rural schools had a higher readiness to implement systemic reform but that there was skepticism about availability of resources such as time and funding and about whether change would produce improvement.

Third, there is no research on knowledge activities or knowledge management practices related to implementation of the QSM. A number of authors and researchers have identified barriers to knowledge transfer that include the emotions and experiences of sense-making individuals (Rogers, 1994), characteristics of the knowledge transferred (Kogut & Zander, 1992; Nelson & Winter, 1982; Winter, 1987), the peculiarities of the relationship and of the social context in which the transfer is embedded (Hansen, 1999; Kostova, 1999; Szulanski, 1996), limited information processing capacity (Arrow, 1974), and distortions in the communication process (R. Barnhardt, 1992; Putnam, Phillips, & Chapman, 1996; Stohl & Redding, 1987). This research is significant, then, for its potential to reveal the extent to which knowledge activities and practices, described using the Baldrige in Education Criteria, must be in place for the QSM to be sustained.

Fourth, the Baldrige in Education Criteria, while not new as an educational research tool, have not been used by the studied districts to review their implementation of the QSM. A number of recent researchers have found that the Baldrige theoretical model was not the same as the model in practice in their research

(Badri, Selim, Alshare, Grandon, Younis & Abdula, 2006; Bou-Llusar, Escrig-Tena, Roca-Puig, & Beltran-Martin, 2005; Evans & Jack, 2003; Pannirselvan & Ferguson, 2001; Samson & Terziovski, 1999; Wilson & Collier, 2000; Winn, 1996). No one has yet created a structural model that shows the implementation of school reform, described by the Baldrige criteria, in rural Alaska school districts. The results of the study may provide practical guidance for others who want to implement the QSM and use the Baldrige in Education Criteria to measure their progress.

1.6 Methodology

In the introduction to Chapter 1, I said that this research was an "inquiry" into the stated problem. I used the term inquiry based on Eisner's (1998) distinction that it is broader than either of the terms research or evaluation and inclusive of qualitative thought and reflection in all of the decisions that had to be made. Eisner explained that our knowledge of the world is empirical or tacit – we make it explicit through our choice of representation (p. 28). The theoretical basis for this research is pragmatism, the strategy where researchers consider all possible approaches to understanding a problem. Creswell (2003) identified four schools of thought, or paradigms, that can be used to guide researchers as they determine the best strategies of inquiry and methods to use in addressing research questions: postpositivism, constructivism, advocacy/participation, and pragmatism (p. 6). Postpositivism relates closely to the scientific method whereby researchers seek to identify the causes that influence outcomes and to reduce broad ideas into a discrete set of ideas to test. Constructivists, conversely, set broad, general, open-ended research questions that value the

"meanings others have about the world" (Creswell, p. 9) and utilize qualitative research approaches. Researchers who utilize an advocacy/participatory lens approach their qualitative research with an action agenda for reform that seeks to give voice to those who have been marginalized or disenfranchised (Creswell, p. 10). Finally, pragmatists consider all possible approaches to understanding a problem and consider the research problem, rather than commitment to a quantitative or qualitative research approach, to be most important. "Pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as to different forms of data collection and analysis" (Creswell, p. 12).

Pragmatism allows researchers to be guided by ethical and philosophical considerations like respect for culture and the desire to produce results with immediate, practical implications. Adopting a framework of pragmatism allowed for the incorporation of considerations that Weber-Pillwax (1999) and Steinhauer (2002) named as important for research in indigenous communities, such as the interconnectedness of all things and the impact of the researcher's motives and intentions on local communities.

This research involved three rural Alaska school districts that had implemented the QSM of educational reform for at least 3 years. The study used a mixed-methods approach with a concurrent nested design to determine teachers', administrators', and community members' perceptions of the importance and existence of characteristics of the QSM, using the Baldrige in Education Criteria as a lens to view implementation. The primary method was quantitative, using a 72-item Likert-response questionnaire

to gather data from administrators, teachers, and classified staff of the three school districts, with 14 semi structured interviews of parents, elders, school board members, and community members conducted secondarily to gather data from a different audience. Finally, QSM-specific reports and documents were examined. Advantages of the selected mixed-methods approach included the ability to elaborate on the results of the questionnaire with the interview data and the ability to extend the breadth of the inquiry by selecting interview participants who were not part of the questionnaire group and who most likely represented the cultural majority of the community. Participation in the research was voluntary on the part of each school district and individual, and permission to cooperate in the study was received in writing from each district superintendent. The questionnaire was administered electronically via the Internet—all staff members with district e-mail accounts were invited to participate—in the spring of 2007. The interviews and the document review were conducted during the summer and fall of 2007. A complete description of the statistical methods used to analyze the data is in Chapter 3.

1.7 Limitations of the Study

Participation in this research study was a convenience sample, meaning that individuals could choose whether or not to participate. The design of the questionnaire for this research was based on the premise that individuals could distinguish between their beliefs about what was important and whether or not the statement being measured was actually in practice in their district. Web-based technology was used for the questionnaire, which adds many conveniences to data collection and is time saving

for respondents but may not provide the same degree of reflection as pencil-and-paper questionnaires. The number of complete cases used for quantitative analysis was 212—too few cases for some types of comparative analysis such as MANOVA. The amount of data also limited the number of causal paths that could be tested using structural equation modeling. Rural Alaska school districts implementing a standards-based, systemic school reform model were the subject of this research, which could limit generalizability. Knowledge activities in these three districts take place over long distances and therefore possess characteristics different from the same activities in more urban or suburban settings.

1.8 Definition of Terms

Definitions of key terms used in this study are found in Appendix B.

1.9 Organization of the Dissertation

Chapter 1 introduced the study by stating the problem and provided background for the study and the districts that participated in the study. Knowledge management concepts were introduced and related to the implementation of the QSM. Reasons were stated for the significance of this study, and the theoretical basis for the choice of research methodology was explained, along with potential limitations of this study. Looking ahead, Chapter 2 contains a review of literature related to education reform policy and research; the Alaska-specific education reform context; organizational structure and systems; research relevant to the QSM; knowledge management theory and research; and research and theory related to change. Chapter 3

describes the methodology that was used for this research and the qualitative and quantitative data analysis procedures that were selected. Analyses of the questionnaire and interview data are presented in Chapter 4. Last, Chapter 5 summarizes and discusses the results.

CHAPTER TWO: LITERATURE REVIEW

Darnell and Hoëm (1996), in their discussion of research to date on education in Native communities, noted several shortcomings. One was failure of the researchers to "take into consideration the circumstances of educational systems as integral components of the society. As a means to develop a comprehensive body of knowledge concerned with education in Native communities, this is essential" (p. 258). They also found that some research failed to balance theory with implementation and cautioned that research to improve education in the far North should draw from and combine findings from multiple disciplines.

Accordingly, in Chapter 2 the QSM of education reform is situated within the context of national and Alaska-specific education reform research and policy. A review of systems theory and organizational structures literature and the quality perspective embedded in the Malcolm Baldrige in Education Criteria were considered relevant for inclusion in Chapter 2 because the QSM is an example of systemic education reform, draws from Deming's quality principles, and is influenced by the Baldrige Education Criteria for Performance Excellence. Knowledge creation and use are the core technology of education and are also significant to organizational functioning and change. Knowledge management literature and research are presented related to Baldrige in Education, the components of the QSM, and the cultural context of education in rural Alaska.

Key phrases used to search the theoretical and empirical literature for this chapter were *Baldrige in Education* (197 results); *comprehensive school reform* (820

results); *total quality management in K–12 education* (15); *K–12 systemic educational reform* (40); *role of knowledge in education reform* (57); *knowledge management in public schools* (147); *organizational learning and public school reform* (63); *organizational communication* (1,510); *data and K–12 school improvement* (56); *communities of practice* (1,513); and *learning communities* (2,265). This research is part of a larger project by a cohort attempting to answer related questions about the implementation of the QSM of systemic school reform. A total of 824 sources of literature were found that were of general interest to all four cohort members, along with 311 sources of empirical evidence in the form of recent dissertations primarily related to Baldrige in Education, comprehensive school reform, and the role of knowledge in education. Knowledge management by that name is fairly new to education. The focus on knowledge management in education has been sharpened by the NCLB legislation and the need for information to accomplish systemic education reform efforts. Specifically related to knowledge management, there was a large amount of literature, most of which was related to organizational communication, learning communities, and communities of practice. An encouraging number of dissertations were found (97), though most of them were ultimately not relevant to the topic of this study. Obviously, for the scope of this research, a process was needed to select the most relevant material.

Glatthorn and Joyner (1998) and Gall, Borg, and Gall (1996) each described a fairly straightforward process for evaluating such a large number of search results. They recommended looking for key authors related to the selected topics, checking the

title and document type to look for research studies and theory rather than reports of practice, looking for the most current information, and concentrating initially on scholarly or refereed journals. This left a much smaller group of abstracts that I read to pare down the resources to those most relevant and useful. Major authors on knowledge management topics whose work is discussed in this chapter are shown in Table 2.1.

Table 2.1 Major Knowledge Management Authors Included in Chapter 2

Author(s)	Subject
Nonaka and Takeuchi	Middle-up-down management; hypertext organizations; tacit knowledge
Davenport and Prusak	Overview of knowledge activities; organizational knowledge politics; knowledge markets
Leonard	Characteristics of knowledge leaders
Cohen and Levinthal	Absorptive capacity
Taylor and Osland	Role of culture
Barnhardt and Kawagley	Traditional ways of knowing
Wilson	Cross-cultural knowledge management
Senge	Learning organizations; double-loop learning
Argote	Organizational learning and knowledge transfer
O'Dell and Grayson	Knowledge transfer and best practice
Szulanski	Sticky transfer
Argyris and Schön	Double-loop learning

To help narrow down the 311 empirical studies from the initial search, I again used the processes described by Glatthorn and Joyner (1998) and Gall et al. (1996), narrowing the number of possible titles to 91. Some of the process features described

by Marzano, Waters, and McNulty (2005) in their meta-analysis of leadership studies were used to focus the study of recent dissertation research to 21 reports. In their process, Marzano et al. first identified key conditions for inclusion in the group of studies they considered, such as span of time, location of the schools, size of the sample, and so on. Many of the empirical research studies on the topics of Baldrige in Education and CSR were case studies, sometimes with very small samples with results and conclusions that were not supported by other writers. Themes that emerged from more than one study were noted for inclusion in this chapter, particularly when the results were consistent with the theoretical or expert literature.

Four studies of the QSM were found and are discussed in detail in this chapter. The earliest study, done by Jester (2001), was a case study of the development of the reform model in Chugach School District and raised some considerations about transferability of the model to other districts. Marzano (2005) looked at the design of the QSM, with specific emphasis on the Balanced Instruction component. The third study, done by Coladarci et al. (2005), correlated student achievement in schools within districts implementing the QSM to the implementation of the model. A fourth study, conducted by Reagle (2007), examined the role of community voice in the implementation of the QSM.

There are seven sections in Chapter 2. First is a review of the historical context of education reform and the federal policy framework for reform. Education reform is then discussed in the Alaska context. The third section presents systems theory as a reference for current reform, and the fourth section contains theoretical and empirical

literature related to quality concepts and Baldrige in Education. Section 5 provides the theoretical background for the QSM. A discussion of knowledge and knowledge management concepts and research is presented in section 6, and the last section of Chapter 2 contains a discussion of change in the context of education and related to knowledge activities.

2.0.1 Mental Models, Metaphor, and Waves

Senge et al. (2000) called working with mental models (tacit knowledge) the most practical of their five disciplines for improving organizations and systems. Nonaka (1994) said that one effective way of converting mental models, or tacit knowledge, into explicit knowledge is through the use of metaphor. The essence of metaphor is understanding and experiencing one kind of thing in terms of another. Nonaka quoted Lakoff and Johnson, saying, "metaphor is pervasive in everyday life, not just in language but in thought and action. Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature" (p. 21). Further, Nonaka said that the association of meanings by metaphor is mostly driven by intuition and involves images. Metaphors provide much room for free association. Metaphors generate a creative, cognitive process that relates concepts that are far apart in an individual's memory.

Eisner (1998) stated that the potential of metaphor to describe a setting and convey the content of human experience is tremendous. Metaphor expresses meaning rather than stating it. Advocating a rich use of language that includes metaphor in research description, Eisner said, "The portrayal of the world [in a social science

study] must be eventually be made public through some form of representation" and "metaphor would be one way to use language to represent results" (p. 29).

Cuban (1990b) used the metaphor of wave cycles in his description of education reform and the way it occurs. Education reform efforts, like waves, can be classified based on how they were generated, how deep they are, how long they are, and their relationship to other forces. Like waves, education reform can be difficult to measure in progress; its effect is sometimes easier to see in retrospect. As a storm approaches, waves become shorter in duration and closer together. The same is true for education reform in times of real or man-made dissent or conflict. Various education reform initiatives can even be described much like different types of waves. Rolling waves occur in sheltered areas and are gentle; plunging waves are unexpected; constructive waves build up a beach slowly over time; and destructive waves carry a lot of energy and build up speed as they reach a beach (Knowles, 1997). Cuban said that education has experienced wave after wave of intense public attention to schools, which drive reform. His wave metaphor continued,

> Within each series of waves breaking on the shores of public attention, there are smaller ones. There is the mini-wave of rising and falling expectations; there is the mini-wave of policy talk where new phrases are coined and become part of the reformers' vocabularies only to fall into disuse; there is the mini-wave of the change process itself ... As mini-waves within the larger wave action, they overlap, often lagging behind or forging ahead of a companion

> mini-wave producing over time, one large wave of public attention that comes to a close as another begins. (1990b, p. 9)

Cuban's metaphor of waves is used in section 1 of Chapter 2 to frame the discussion of past and present education reform.

2.1 Education Reform

The three waves of education reform described in this chapter correspond to the persistent interest of U.S. policymakers in reforming education since the end of World War II. Cuban (1990) noted, "Reform visions often depend on a view of the past as a series of failures that killed a golden age of schooling" (p. 3). Cuban said that education reforms tend to focus on three recurring debates. The first debate is over pedagogy—teacher-centered (i.e., lecture based) or student-centered (i.e., discovery learning) delivery of instruction. The second debate is over curriculum—an academic curriculum that is the same for all students (fitting the student to the curriculum) or differentiated based on student interest and need (fitting the curriculum to the student). The third recurring debate is over centralized or decentralized authority over schools.

Cuban (1990) wrote that these three issues in education have been debated in one form or another for over 150 years and that their recurrence suggests that reform policy and initiatives have so far failed to remove the problems they were intended to solve. He offered two reasons that issues reappear. The first reason is because the debates are essentially value conflicts. When social, economic, and demographic conditions create change and turmoil, the dominant societal values shift, and particular values receive renewed attention. Of this cause for recurring issues, he said,

> Value conflicts, then, are not problems to be solved by the miracles of a science of schooling; they are dilemmas that require political negotiation and compromises among policy makers and interest groups—much like that which occurs in the larger society. There is no solution; there are only political tradeoffs. (Cuban, p. 8)

The second reason issues reappear is that Americans have enduring faith in schools as an engine of social and individual improvement. That faith causes policymakers to turn their attention to schools as the tool for reform whenever social problems reemerge. President Lyndon Johnson once said, "The answer for all our national problems comes down to one single word: education."

The three major waves of education reform differed in their focus, the forces that generated the wave, the role of policy, and the knowledge activities that were predominant. The major elements of each wave of education reform are shown in Table 2.2.

Table 2.2 Three Waves of Education Reform

	Wave 1	Wave 2	Wave 3
Characteristics of the wave	Increased graduation standards; changes to the academic calendar; changes to the structure of education programs	Changes in education pedagogy; voluntary curriculum standards; flexible use of time/student grouping; importance of work and life skills	Major philosophical change to universal competence; systemic change; focus on outcomes for students and rigorous requirements for teachers; parent choice
Major forces	*Youth in Transition* (1973); *Nation at Risk* (1983); ESEA Title I (1965)	*Prisoners of Time* (1994); Goals 2000; SCANS Report (1991); Effective Schools research (1982+)	NCLB (2001); components of CSR
Policy role	Creation of U.S. Dept. of Education to provide federal guidance to states related to education	Favored state versus federal control; encouragement of local initiatives; encouraged voluntary participation in development of standards	Increased federal control; accountability for states and districts tied to federal funding; state focus on accountability monitoring and assistance to local districts
Knowledge focus	Task analysis to determine students' prior knowledge	Information sharing for site-based decision making; teacher learning and communities of practice	Knowledge sharing for organizational continuous improvement; data-driven instructional and organizational decisions; shared visioning

The QSM of education reform was designed to produce the kind of systemic and sustainable changes to the educational process that are associated with the third wave of education reform. The components of the model also show the influence of research that produced the characteristics found in second-wave education reform efforts, namely standards-based instruction and flexible use of time. This section reviews the history of the three waves of education reform over the last 50 years.

2.1.1 Wave 1: ESEA to A Nation at Risk

A Nation at Risk, the report by the National Commission on Excellence in Education (1983), is frequently cited as the catalyst for education reform in the United States. Its warning about the rise in the acceptance of mediocrity in the United States "motivated more significant changes in the manner in which American K–12 public schools conduct business than virtually any event or condition preceding it" (Guthrie & Springer, 2004, p. 8). However, several events prior to that report generated the swells that resulted in the first wave of reform.

The Elementary and Secondary Education Act (ESEA), signed into law by President Lyndon Johnson in 1965 as part of his "War on Poverty," increased the federal government's authority over schools by providing targeted resources to disadvantaged students. Historically, the ESEA corresponded to the U.S. Civil Rights movement. Title I of the ESEA imposed fiscal accountability on states and districts by requiring them to use federal money only on schools with the highest concentrations of poverty; to equalize the amount spent on these schools to that allocated to schools not receiving federal education dollars; and to use Title I funds as a supplement to, rather than a replacement for, local spending (Wong, 2003). President Johnson (1965) claimed that "every one of the billion dollars that we spend on this program will come back tenfold as school dropouts change to school graduates" (para. 4). His statement was quickly challenged by the Coleman Report.

The Coleman Report, officially titled *The Equal Educational Opportunity Survey* (Coleman et al., 1966) was a congressionally mandated study by the U.S.

Office of Education to investigate the effects of school resources on student achievement. The Coleman Report concluded that a student's family background was the primary factor in a student's success in school and that no matter what schools did, they could not reverse the effects of family and home conditions. The results were interpreted by many to suggest that schools have little effect on student achievement, though some have argued that "this interpretation confuses the effects of measured differences with the full effects of school and has been shown to be wrong," (Hanushek, 1998, p. 19). The findings of the Coleman Report were controversial, and other researchers responded to what they considered fatalistic conclusions from the Coleman Report with research of their own. One early team of researchers, Klitgaard and Hall (1974), challenged the methodology of Coleman's input/output studies. They claimed that because the study examined the average effect of all schools in a sample on student outcomes, it measured only general effects and that the effectiveness of individual students could be masked. Klitgaard and Hall warned that some effective schools might go unnoticed. Both proponents and critics of the report leveraged it in ways that influenced the larger political platform of education reform, as well as the specific structures of school reform models.

The Coleman Report was followed by two additional influential reports, written a decade apart. The first report was *Youth: Transition to Adulthood* (1973), and the second was *A Nation at Risk*, published in 1983. While both reports addressed the need for change in American education, they differed in their focus and in the amount of attention they received. The *Youth: Transition to Adulthood* panel was also chaired

by James Coleman. The report was written by a panel of President Nixon's Science Advisory Committee, and the unit of focus was adolescent students, whereas the much shorter 1983 *A Nation at Risk* report focused on the institutions designed by adults to serve students. The *Youth* report identified seven adolescent issues that every environment resolves in one way or another: segregation from adults versus integration with adults; age segregation among the young; grouping by stage of development; patterning of self-development and productivity; role segmentation versus community; the scope of formal schooling; and the legal status of youth. The *Youth* report called for narrowing the duties of the high school; creating additional learning sites within the community; alternating school and work for student learning; developing opportunities for public service; a balance of protection versus opportunity for youth; and a revamping of the current forms of student assessment. Interestingly, some of the changes in education proposed in the *Youth* report were historically features of traditional Native ways of learning (i.e., a community basis, a focus on what was good for the group, and performance assessment).

When *A Nation at Risk* was published in 1983, it was "a seminal event in the sense that it called attention to the question about the quality of education in the country" (Casserly, 2005, para. 6). Its forceful language warned that "America's place in the world will be either secured or forfeited" (The National Commission on Excellence in Education, 1983), and it provided the first concrete step in the education reform that would follow: It articulated a problem and the national and international consequences for the United States. Unlike the *Youth* report, many saw *A Nation at*

Risk as offering recommendations that were concrete, focused, and tied to familiar elements of the school system (i.e., time, graduation requirements, and discrete subjects to be taught). Its findings targeted the curriculum, expectations for students, time spent on learning, and the preparedness of teachers. The report criticized everything from curriculum offerings that were too broad to poor management of classroom time.

Though credited as a catalyst for education reform, *A Nation at Risk* (National Commission on Excellence in Education, 1983) has had much criticism since its publication. Hunt and Staton (1996) called the role of the *A Nation at Risk* report in promoting education reform "serendipitous." Hlebowitsh (1990) called that report "more of a political treatise than a thoughtful statement for the reform of American schools" (p. 88). The report has been criticized for its author's choice of rhetoric and for the way data were used in the report (Guthrie & Springer, 2004). Bracey (2003) wrote that the authors "confused correlation with causation" in relating student achievement on large-scale assessments with national economic conditions.

However, Guthrie and Springer (2004) claimed that *A Nation at Risk* focused national attention on education in a way few other events or documents have. In ongoing Roper poll inquiries, education was the number one answer to the question about the most important issue facing American society (Congressional Institute, 2001). Guthrie and Springer, in writing about the benefits that resulted from *A Nation at Risk*, said, "The principal policy legacy of *A Nation at Risk* was to accelerate a

paradigm shift from measuring American education success by resources received to results achieved" (p. 26).

In summary, the first wave of education reform was characterized by states' efforts to increase graduation standards and tighten academic expectations by lengthening the school days and academic calendar. The federal government created the Department of Education to provide federal guidance related to education matters to states and to ensure equal opportunity for all learners. How to achieve results in education became a policy focus at the national level, while researchers and educators started to focus at the local level on experimentation and implementation of school reform models based on effective schools research, leading to the second wave of education reform.

2.1.2 Wave 2: Goals 2000 and School Restructuring

Wave 2 education reform is best characterized as "bottom-up" restructuring (starting at the classroom and school unit level) to achieve high-quality instruction. The research base that grew in response to the Coleman Report gave rise to the Effective Schools Movement and the overarching questions "Do effective schools exist?" and if so, "What do they look like?" Good and Brophy (1985) reasoned that if some meaningful variation could be found in performance among schools, then it followed that student performance in schools could be improved and that such research would highlight individual schools where achievement was universally high. They summarized their reasoning:

> Student progress clearly varies from school to school, but the real question is whether this variation in achievement among schools is affected by *school processes* or whether this variation can be explained completely in terms of student factors such as aptitude. (Good & Brophy, p. 7)

Sizer, quoted by O'Neil (1995), said of early reform efforts, "Too many reforms never questioned some basic assumptions about how schools are organized" (p. 5). Ultimately, a definition and description of an effective school began to evolve and contained three common elements: a student achievement focus, an emphasis on *all* students, and mastery of basic skills. Mace-Matluck (1986) proposed this composite definition:

> An effective school is one in which the conditions are such that student achievement data show that all students evidence an acceptable minimum mastery of those essential basic skills that are prerequisite to success at the next level of schooling. (p. 5)

The effective schools definition, with its focus on achievement by all students, along with subsequent research, provided an early foreshadowing of the philosophical shift from opportunity to learn to universal competence that was to come 15 years later with NCLB.

In 1982, Edmonds published research that identified common characteristics of schools that were achieving success in educating all students regardless of family background or socioeconomic status. D. U. Levine and Lezotte (1990) continued research started with Edmonds and concluded that all children can learn and come to

school motivated to do so; that schools control enough of the variables to assure that virtually all students learn; that schools should be held accountable for measured student achievement; that schools should disaggregate student achievement results to make sure all students are successful; and that the stakeholders of the school (including the community) are the most qualified to plan and implement changes to ensure all students learn.

The research done by Edmonds and Frederickson (1979) with New York City schools was important for two reasons. It was an early effort to apply the emerging effective schools research to school improvement at the local level, and it provided a model for others to follow. The Edmonds effective schools research named seven interrelated indicators or conditions that influence student learning. These factors, called "correlates," include clear school mission, a climate with high expectations for success, instructional leadership, frequent monitoring of student progress, ample opportunity for all students to learn, a safe and orderly environment, and a positive home–school relationship (Lezotte, 1991).

Many locally developed models of school reform emerged based on the research about effective schools, under the premise that education reform would be more likely if undertaken one school at a time. Independent restructuring initiatives such as the Coalition of Essential Schools (Sizer, 1984, 1992) promoted school restructuring in ways that featured shared leadership and decision making. The Coalition of Essential Schools was formed in 1984 initially to support a group of 12 schools that agreed to restructure using a set of design ideas that stemmed from the

results of 5 years of research called *A Study of High Schools* cosponsored by the National Association of Secondary School Principals and the Commission on Educational Issues. The study, led by Theodore Sizer, concluded that American high schools, regardless of their location, were very similar and inadequate for promoting high student achievement. A set of common principles evolved from the Sizer research used by Coalition schools to guide school restructuring. The purpose of the Coalition principles was to foster deep understanding and love of learning as well as to promote differentiated instruction and assessment (Coalition of Essential Schools, 2002).

During this same time period, national-level leaders explored how federal policy could be leveraged to address U.S. educational issues in a more cohesive, accountable manner. The first National Education Summit was held in Charlottesville, Virginia, in 1989, and the nation's 50 governors were invited with the intent to establish education goals for the country. The result was a policy framework organized around six national education goals (later expanded to eight), to be met by the year 2000. The eight national education goals were as follows:

1. All children will start school ready to learn.
2. The high school graduation rate will increase to at least 90%.
3. All students will become competent in challenging subject matter.
4. Teachers will have the knowledge and skills that they need.
5. U.S. students will be first in the world in mathematics and science achievement.
6. Every adult American will be literate.

7. Schools will be safe, disciplined, and free of guns, drugs, and alcohol.

8. Schools will promote parental involvement and participation.

These eight goals formed the basis of the Goals 2000: Educate America Act, signed into law by President Clinton in 1994 in order to

> improve learning and teaching by providing a national framework for education reform; to promote the research, consensus building, and systemic changes need to ensure equitable educational opportunities and high level of educational achievement for all American students;... [and] to promote the development and adoption of a voluntary national system of skill standards and certification ... (§ 1)

A key stated principle of Goals 2000 was bottom-up reform "of community-based solutions to local educational needs," while the role of policy was seen as providing high expectations. The Goals 2000 legislation encouraged states and school districts to develop academic and occupational standards (Riley, 1995). Professional organizations such as the National Council of Teachers of Mathematics (1989, 1991, 2000) and the International Association of English Language Arts Teachers were motivated to develop content and instructional standards that were offered for use in creating voluntary state and local standards. A National Education Goals Panel was created to assess and report state and national progress toward achieving the goals.

Complementing Goals 2000 was the Improving America's Schools Act (1994), a reauthorization of the ESEA of 1965 that continued Title I funding for schools with a large percentage of low-income students. Like Goals 2000, the reauthorization of

ESEA Title I included the concept of local control over change in education. Goals 2000 and the reauthorization of ESEA allowed unprecedented flexibility in use of federal funds for educational purposes. Rather than endorsing compensatory educational programs to targeted students utilizing "pullout" programs, schools were permitted to develop school wide reform programs. During the period from 1994 to 1997, the federal General Accounting Office reported that 39% of Goals 2000 money went to subgrants to fund local education reform activities (General Accounting Office, 1998). Additional federal funding was available for schools willing to create or embrace an education reform model that included nine research-based criteria, called the Components of Comprehensive School Reform (CSR). The significance of the inclusion of CSR funding in federal legislation was the formal government recognition of the conclusions of researchers about the features of effective schools. The CSR criteria are shown in Table 2.3.

Table 2.3 U.S. Department of Education Criteria for a Comprehensive School Reform Program

Criterion	Description
1	Employs proven methods for student learning, teaching, and school management that are based on scientific research and practices that have been replicated successfully in school
2	Integrates instruction, assessment, classroom management, professional development, parental involvement, and school management
3	Provides high-quality and continuous teacher and staff professional development and training
4	Includes measurable goals for student academic achievement and establishes benchmarks for meeting those goals
5	Is supported by teachers, principals, administrators, and other staff throughout the school
6	Provides for the meaningful involvement of parents and the local community in planning, implementing, and evaluating school improvement activities
7	Uses high-quality external technical support and assistance from an entity that has experience and expertise in school-wide reform and improvement
8	Includes a plan for the annual evaluation of the implementation of the school reform and the student results achieved
9	Identifies the available federal, state, local, and private financial and other resources that schools can use to coordinate services that support and sustain the school reform effort

Adding to the size and effect of Wave 2 education reform was the *What Work Requires of Schools* report written by The Secretary's Commission on Achieving Necessary Skills (SCANS; 1991) under the direction of the U.S. Secretary of Labor. Commonly known as the SCANS Report, it restated the theme of education related to

national economic interest found in *A Nation at Risk.* The SCANS Report focused on how schools prepare young people for work and identified the skills, personal qualities, and competencies necessary for successful job performance. The five student competencies cited in the SCANS Report included identification, organization, and allocation of resources; ability to work with others; ability to acquire and use information; understanding of complex systems; and ability to work with a variety of technologies. The report went on to say that students needed to develop foundational skills in reading, writing, and math as well as to learn to think creatively, make decisions, solve problems, visualize, and understand how to learn and reason. The SCANS Report called for schools to help students develop the personal qualities of responsibility, self-esteem, sociability, self-management, integrity, and honesty. Reflecting its genesis in the U.S. Department of Labor, the SCANS Commission consisted primarily of business leaders, and the language of the report applied business systems thinking, quality management, and high-performance rhetoric to education.

The 1994 Federal *Prisoners of Time* (Kane, 1994) report gave further high visibility to the call for changes to instruction and learning, saying,

> By far the most important part of this Commission's charge relates not to time but to student learning.... As witnesses repeatedly told the Commission, there is no point to adding more time to today's schools if it is used in the same way. We must use time in new, different, and better ways. (p. 30)

The report went on to call American schools "flawed by design," based on the assumption that all students learn at the same pace, and called for mixed-age

classrooms where students could be flexibly and appropriately grouped based on achievement needs. *Prisoners of Time* echoed the call of others for more inspiring curriculum and instructional strategies. Content standards developed by professional organizations addressed this last point by shifting the instructional focus to deep conceptual understanding, problem solving, and application of learning.

2.1.3 Wave 3: Systemic Reform

Educational leaders gradually began to envision a third wave of education reform that was systemic and included all facets of the educational system (Elmore & Fuhrman, 1995). School restructuring within the larger context of systemic school district reform had been stressed by many education experts—Darling-Hammond (1996), Fuhrman (1993), Fullan, (2001a), Murphy and Hallinger (1993), Newmann and Clune (1992), Newmann and Wehlage (1995), and Sizer (1992)—and within the effective schools research done by Brookover, Edmonds, Frederickson, and Lezotte beginning in the late 1970s.

Federal-level support for a systemic approach to reform signaled a shift in understanding that simply adopting the latest program was not enough to effect long-term change. Unfortunately, the accountability movement ushered in by NCLB challenged this understanding with a desire for quick fixes that, more often than not, led to frustration for students and school staff because of the lack of sustained improvements (Dale, 2003). Federal policy rhetoric encouraged local control of education through Goals 2000, but this was diluted by the sanctions in NCLB that returned control to the federal government in unprecedented proportions. The current

condition of education is "symbolized by measurement of outcomes and the construction of today's accountability systems. The No Child Left Behind [legislation] is the driving transitional force behind this" (Guthrie & Springer, 2004, p. 31).

Signed into law in January 2002 by President Bush shortly after his inauguration, the No Child Left Behind Act of 2001 (NCLB) reauthorizing the ESEA initially had unprecedented bipartisan Congressional support. The four stated principles or "pillars" of NCLB were stronger accountability for results, more choices for parents, greater local control and flexibility, and the use of proven educational methods. Accountability measures required the establishment of state standards in reading and math, annual testing for all students in Grades 3–8, and development of annual statewide progress objectives to ensure that all groups of students reach proficiency by the year 2014. Schools that fail to make adequate yearly progress (AYP) toward statewide proficiency goals are subject to increasingly intensive corrective actions. Increased parental choice is provided by allowing students who attend Title I schools identified for improvement the opportunity to attend a school that has met AYP. Parents may also elect supplemental services for their children at the underperforming school's expense. Local control and flexibility are provided to states, districts, and schools in determining how NCLB and AYP requirements will be met, though the degree of that flexibility depends largely on whether or not schools and districts are meeting AYP. For example, transferability of federal funds between four different federal programs is permitted, provided AYP requirements are met. In a nod to the sizeable research base on effective education, the NCLB law stipulated that

school and district improvement efforts must utilize "scientifically based research" as the basis for educational programs and classroom instruction. The Title I and Title V sections of NCLB made changes to the Comprehensive School Reform Demonstration Program (1997) by adding two new components: support for school staff and the use of scientifically based research.

The accountability measures of NCLB have changed the nature of local and state control over education. According to Guthrie and Springer (2004),

> For most of the [last] three and a half centuries ... U.S. public education has been dominated by a doctrine of state plenary authority mixed with the practical reality of local school district management discretion ... The new reality is that the accountability measures mandated by NCLB are a new driving force in American education. In essence, the federal government is now the principal propelling policy agent behind American education. Herein may reside, for better or worse, the ultimate legacy of *A Nation at Risk.* (p. 33)

Information and research on the results of NCLB are now accumulating. The nonprofit Center on Education Policy (CEP) studied the effect of NCLB since its passage through surveys and interviews of state departments of education officials and case studies of individual schools and school districts to determine the impact of the policy. Jennings and Rentner (2006) of the CEP believed test-driven accountability had become the norm for public schools. Porter (2006) said that the accountability and other measures of NCLB had ushered in a philosophical shift from opportunity to learn to universal competence. Related to the universal competence paradigm,

Rothstein, Jacobsen, and Wilder (2006) stated their opinion that "proficiency for all" was an oxymoron. They wrote,

> No goal can be both challenging to and achievable by all students across the achievement distribution. Standards can be either minimal and present little challenge to typical students or challenging and unattainable by below-average students.... it would be impossible to craft standards that simultaneously challenge students at the top, middle, and bottom. (p. 32)

They did agree, however, that closing achievement gaps, meaning elimination of the variation in achievement between socioeconomic groups, is "daunting, but worth striving for" (Rothstein et al., p. 32). However, Lezotte (interview in Sparks, 1993) voiced a different viewpoint related to success for all students. He said it would be foolish to think we need to know everything we need to know to produce 100% success before beginning to make positive changes. In his opinion, resources already exist to help 95% of students succeed by revising instructional systems. He concluded, "While our mission is successful learning for all, mission statements are not supposed to be descriptions of current reality but of a preferred future state" (p. 18). The concept of universal competence is discussed further in section 2 of this chapter related to education in rural Alaska.

Jennings and Rentner (2006) named four of the big effects of NCLB on public schools 4 years after enactment of the legislation. First, they acknowledged reported increases in student achievement as measured on state tests of reading and math, though they also cautioned that there was no standard for comparison across states.

Second, they noted that curriculum and instruction were more aligned with standards and assessments, and that performance data were used more often for instructional decisions and improvement, with a concurrent improvement in the quality and quantity of professional development for teachers. Third, they found that low-performing schools were more actively engaged in curriculum, staffing, and leadership improvements at the school level than in facing externally imposed changes. Their last finding was that the federal government had a stronger role in education than in the past and that the role of state government in education had also changed to an increased focus on accountability enforcement, monitoring, and assistance. In individual school districts, more duties had been created or assumed than ever before related to NCLB implementation and reporting. States and individual school districts both reported in the CEP study that they did not have enough funds to administer the requirements of NCLB.

Individual school success in implementing the CSR components and effect on student achievement were reported by the U.S. Department of Education in 2004. Data were collected from a sample of 1,032 schools in 37 states between 1999 and 2001. Researchers used surveys of principals and teachers, student assessment data, and focused interviews in a targeted sample of 18 schools. Findings indicated that the incentive of additional federal money encouraged more schools to adopt comprehensive school improvement but that after 2 years, effective implementation of school reform was mixed. The CSR program had a focus on externally developed and scientifically based reform models, but researchers found that most schools had

adapted the reform model they selected to meet their local setting. Professional development of teachers was more likely to be influenced by curriculum content standards and student assessment data than to be focused on broad, comprehensive reform topics or issues. There was no correlation between the small gains in student achievement over the 2 years of the study and implementation of CSR initiatives. Researchers cited the need for more longitudinal study of the data, as implementation of large-scale reform is a process over time. Finally, researchers found few schools that had developed strategies to gain broad, long-term parent and community involvement (U.S. Department of Education, 2004).

Just as history provided a longer lens through which to view the implementation and outcomes of *A Nation at Risk* and *Goals 2000*, time may change the discussion about the benefits and drawbacks of NCLB. For now, some have focused their concerns related to NCLB on the implications of greater federal involvement in education while others have voiced their opinion about the consequences of an increased focus on testing and test results. Bracey (2006) felt the historical strength of U.S. education was its focus on questioning conventional wisdom and students' ability to probe for meaning as preparation for adult life. He quoted Asian and British officials who praised American students' creativity and then quoted Robert Sternberg of Tufts University by saying, "Sternberg calls creativity a habit. If you don't arrange conditions for people to practice the habit, it won't develop. "The increasingly massive … use of conventional standardized tests is one of the most effective…. [ways] for suppressing creativity" (p. 154). Bracey concluded that testing,

in most cases, was the opposite of asking questions and said bluntly that there was nothing creative in test taking.

Into the midst of the controversy over the accountability requirements of NCLB and increased federal involvement in education, a new report was issued by the New Commission on the Skills of the American Workforce (2007). The 26 members of the commission included two former U.S. Secretaries of Labor and two former U.S. Secretaries of Education, as well as numerous business, labor, and university leaders. The report, called *Tough Choices or Tough Times*, returned yet again to the focus on American economic capacity that was found in *A Nation at Risk* and the SCANS Report. The commission worked over a period of 2 years and included studies and research it initiated as well as study of field research in 14 industrialized and emerging countries. The researchers concluded that the United States was falling farther and farther behind in its ability to be competitive in a global economy. They cited as contributing factors the decline in the number of students earning a high school diploma, a decline in the quality of education received by American students, and an increase in the number of highly skilled workers in other countries who will work for less money than their American counterparts. The report echoed Sternberg's and Bracey's calls to foster creativity, saying,

> creativity and innovation are the key to the good life [and] the best employers the world over will be looking for the most competent, most creative, and most innovative people on the face of the earth and will be willing to pay them top

> dollar for their services. This will be true not just for the top professionals and managers, but up and down the length and breadth of the workforce. (p. 7)

The recommendations in the report were based on the premise that large-scale systemic change is needed and included revamping the education timeline to exit more students from school earlier, recruiting teachers with higher academic achievement, and state rather than local control over teacher employment and work assignment – with a call paradoxically to decentralize school organizations. The report also called for equitable versus equal funding for schools, which is a current judicial topic in a number of states, Alaska included, and is closely tied to the concept of universal competence. The *Tough Choices or Tough Times* (New Commission on the Skills of the American Workforce, 2007) report concluded by saying,

> the core problem is that our education and training systems were built for another era, an era in which most workers needed only a rudimentary education. It is not possible to get where we have to go by patching that system. There is not enough money available at any level of our intergovernmental system to fix this problem by spending more on the system we have. We can get where we must go only by changing the system itself. (p. 8)

It is too early to tell what effect this latest call to reform will have on education policy and current reform initiatives such as the QSM. Perhaps the report, which tries to balance the education reform discussion between the greater economic good in the

United States and benefit to individuals, will form a swell to in time become a fourth wave of education reform.

2.1.4 Summary of Education Reform

The three major waves of education reform in the last 50 years have differed in their characteristics, from pedagogical to school-based to ultimately systemic reform. The now-historic Coleman Report gave rise to a proliferation of education reform research that ultimately found its way into federal policy in the form of the CSR criteria. Several major reports were the result of commissions and task forces composed largely of business leaders: *A Nation at Risk*, *Tough Choices or Tough Times,* and the SCANS Report. These reports were notable because they tied educational success and the quality of education to the country's economic future, and because the reports were infused with business concepts such as quality, customer satisfaction, and systemic change. The QSM of systemic education reform bears the influence of education reform history and the characteristics of Wave 2 pedagogical and Wave 3 systemic reforms. The design of the QSM calls for actions and features that researchers found lacking in the implementation of other CSR initiatives, namely community engagement in the reform. The next section details some of the history of education in rural Alaska related to Native children and the specifics of Alaska education reform within the context of the federal policy reform and research discussed in this section.

2.2 Education of Alaska Native Children and Alaska Education Reform

Though it is situated geographically at the western and northern edge of both the country and the continent, Alaska has not been untouched by the national waves of education reform. Other historical events have created an education reform environment and conditions that are uniquely Alaskan, further shaping the QSM. This section begins by tracing the history of education for Alaska's Native children as distinct from education for the non-Native population. Next, the history of education reform in Alaska is described as parallel to and influenced by national education reform, but also including unique initiatives like Alaska Onward to Excellence, the Alaska Rural Systemic Initiative, and the development of Standards for Culturally Responsive Schools. Third, the literature and research related to the cultural disconnect between Western educational pedagogy and Alaska Native students is reviewed. This section concludes with a discussion of the philosophical shift in education policy from the opportunity to learn to universal competence and a review of the strategies recommended by researchers for increasing achievement for Alaska Native students.

2.2.1 History of the Education of Alaska's Native Children

History provides a long trail of policy and legislative and judicial actions related to the philosophy, purpose, and process of Alaska Native education. Historically, in Native communities, knowledge was passed on informally but always connected to and grounded by the local cultural and physical environment. Native

"ways of knowing" traditionally were largely tacit, passed on through observation and guided practice. (A more complete comparison of the traditional Native and Western approaches to knowledge is included later in this section of Chapter 2). In the 200 years since Western contact, the education of Alaska's Native children has gradually shifted from culturally grounded Native ways of teaching and learning to the highly structured form of Western education (C. Barnhardt, 2001). This path of educational change has included both statewide and innovative local reform efforts.

The first White settlers in Alaska were Russian fur traders, who opened religious catechism schools for some of the Native laborers and their children. After the purchase of the territory of Alaska by the United States in 1867, schools for rural Native Alaskans continued to be run by missionaries and by the newly established Bureau of Indian Affairs, a unit within the Department of the Interior (Darnell, 1979). Then, in the early 1900s, while the territory was still governed from Washington, DC, new federal legislation allowed Alaskan communities to incorporate and establish locally governed schools. In 1905, the Nelson Act established schools for White and mixed-race children in areas that were unincorporated, with Native students still educated by the federal Bureau of Indian Affairs. This dual system of education wasn't abolished until 1967 in the wake of the U.S. Civil Rights movement. Notably, though, at the end of World War II, Alaska's Territorial Commissioner of Education proposed a single school system for Natives and non-Natives, as well as a common curriculum, but the proposal was rejected by the U.S. government.

The dual education system meant that in communities with both Native and non-Native populations, two government schools were maintained. Darnell and Hoëm (1996) said of this arrangement, "[paradoxically], students in one segment of the population received an education based on the culture of the home; in the other, students received an education alien to the culture of the home" (p. 66). Though educational opportunity and choices have changed since then, in testimony before the U.S. Commission on Civil Rights, the president of the Association of Village Council Presidents stated, "[the] children of Native Alaskan villages in effect go to school in a foreign country every day—a foreign country because they don't speak the language and they don't learn about their culture and traditions" (Alaska State Advisory Committee to the U.S. Commission on Civil Rights, 2002).

Until the 1970s, Alaska's rural Native students had to leave their villages to attend a high school. Many students were sent to Bureau of Indian Affairs-run boarding schools in the "lower 48" states or to Mt. Edgecumbe boarding school in Sitka, Alaska. Ray (1958), quoted in S. E. Cotton (1984), said, "The federal policy was to acculturate Alaska Natives by sending the most intellectually advanced youths to boarding schools for a vocational education, then returning them to their village" (p. 31).

As an alternative option for high school education for rural students, in the 1960s and 1970s the government maintained a Boarding Home Program and created regional schools in Alaska, both of which still required students to leave their home villages to attend school. Many of the grandparents and parents of today's Native

students attended school under these circumstances and conditions. During this era, the educational philosophy of the federal government toward Native students included an expectation that Natives would become assimilated into non-Native culture, and the high school curriculum was strictly vocational (R. Barnhardt, 2005; S. E. Cotton, 1984; Darnell & Hoëm, 1996). The boarding school program was abandoned only after documentation of an alarming increase in the suicide rates for Native students.

Legislatively, the U.S. Congress defined the educational rights of all students in the Civil Rights Act of 1964. In the passage of the ESEA in 1965, Congress targeted federal funds toward disadvantaged students. But one of the most significant changes in education in Alaska occurred a decade later in 1976 as a result of the *Tobeluk v. Lind* case, commonly known as the "Molly Hootch case" after the name of the first plaintiff on the list. The lawsuit was based on the argument that rural village high school students did not have equal opportunity to learn because there was no high school in their community (S. E. Cotton, 1984). The settlement of the case spelled out significant conditions for the opportunity to learn: a high school in every village that wanted one, along with provisions for the size of the facility.

Equally significant, the settlement stated that the decision-making power over schools had to be turned over to local communities. This resulted in dismantlement of the previous federal and state system of oversight and administration for Alaska's rural schools and the creation of 20 (now 23) new regional school districts, called Regional Educational Attendance Areas (REAAs). Of importance is that the REAAs had responsibility for school curriculum, staffing, and budgets.

Most recently, the issue of adequate funding for education of students in rural communities was argued in the Alaska Supreme Court. Two of the school districts in this study, Bering Strait and Kuspuk, were plaintiffs in the *Moore v. State of Alaska* (2005) class action suit that alleged that the State of Alaska was not adequately funding education in rural Alaska. The Alaska Supreme Court ruled in 2007 that while there was a preponderance of evidence that the State was not adequately funding rural education, the State was also not adequately monitoring district use of resources to meet the educational needs of students. A final decision in the case is expected in 2009 or 2010, with the court allowing the State the intervening time to provide assistance to low-performing districts. It is within this local and state milieu that recent educational reform in Alaska has occurred.

2.2.2 Educational Reform in Alaska

Most state-level reform efforts in Alaska schools are based on "national models related to issues of accountability, standards, and standardized testing of students and teachers" (C. Barnhardt, 2001, p. 26). These efforts have followed a timeline and process similar to those in other states and have included many of the same state policy changes with resultant standards around which school districts were encouraged to organize curriculum and instruction. In the 1990s, Alaska responded early to federal educational policy changes and the call for states to develop academic standards. Work to create voluntary content standards started in 1991 and was named the Alaska Quality Schools Initiative (QSI) in 1996. State-administered QSI grants provided incentive funds to districts if they adopted standards, provided additional

services to students who weren't meeting the standards, and trained staff to monitor student learning to meet the standards. By 1998, Alaska state law mandated competency testing before students could receive a high school diploma (initially effective in 2002, later changed to 2004); development of student performance standards in reading, writing, and math; and a requirement that districts annually report specific information about student and district performance to the state and local communities in the form of published "school report cards." Reform efforts for the past 5 years have mirrored those in other states to achieve compliance with NCLB legislation.

Several reform efforts in Alaska, including the QSM, have attempted to resolve differences between state- and federal-level accountability and local control. One reform effort unique to Alaska was the Rural Systemic Initiative (AKRSI), started in 1996 with several large grants. Housed at the University of Alaska, the purpose of AKRSI was to integrate the indigenous knowledge system and the formal Western-style education system. AKRSI consisted of five initiatives: Native Ways of Knowing and Teaching; Culturally Aligned Curriculum Adaptations; Indigenous Science Knowledge Base; elders and Cultural Camps; and Village Science Applications. All three of the districts in this study have had a high level of involvement with the various components of the Rural Systemic Initiative and use curriculum developed through the initiative (personal communication, R. Barnhardt, 2008). The results of the initiative have included documentation of indigenous knowledge systems and the development of culturally based curricula, especially in science and math. Evaluators

of AKRSI found some evidence of higher student achievement in districts that participated in the initiative and a greater percentage of students who started postsecondary education, with a higher proportion of students who chose rigorous curricula at the University of Alaska. They also documented a decrease in student dropout rates, though the rates were still higher than the state average (Kushman & Barnhardt, 1999).

In 1998, the Rural Systemic Initiative, supported by the National Science Foundation, the Alaska Federation of Natives, the Annenberg Rural Challenge, and local Native Corporations, published cultural standards for Alaska students. These cultural standards contained broad statements of what students should know and be able to do as a result of their experience in a school that was culturally aware. The student standards were later included in a more comprehensive set of standards called the Alaska Standards for Culturally Responsive Schools (Alaska Native Knowledge Network, 1998). The Culturally Responsive Schools document was developed by a panel of Alaska Native educators as a way for schools to measure their effectiveness in meeting students' cultural needs and included the student standards as well as standards for educators, the curriculum, the school, and the community. The Alaska cultural standards are reflected in the design of the QSM. Overall, however, the implementation of the cultural standards has been voluntary and has not been uniform among Alaska schools and school districts.

Another reform initiative, Alaska Onward to Excellence (AOTE), was initially developed at the Northwest Regional Education Laboratory (NWREL) in 1981 as a

result of research on effective schools. The hallmark feature of AOTE, used in Alaska since 1992, was the creation of partnerships between schools and communities. School districts and village schools received guidance and support for working closely with community stakeholders to establish a mission and student learning outcomes. Action steps to achieve established goals were initiated and led by local teams. Speaking of the need for this kind of holistic, community approach to education reform, Kushman and Barnhardt (2001) said, "educational reformers need to realize that in places like rural Alaska, there is a strong link between educational improvement and community health" (p. 25). They further cautioned that reform, to be successful, must be embraced by the community through ownership and that the purpose for the reforms must be absolutely clear and widely supported. In a study of the implementation of the AOTE process, Kushman and Barnhardt found it was most successful in communities where trusting relationships were developed with the community; where parents participated actively in school life and decision-making; where school leadership was shared with community members; and where the schools embraced a larger purpose that included teaching to a set of cultural standards. A third reform effort, the QSM, has attempted to incorporate some of the successful national reform efforts in a local manner that emphasizes contextual teaching and increased local governance. It is described in detail in a later section of this chapter.

Despite these reform efforts, barriers to learning have persisted in Alaska, particularly in rural communities and for some Alaska Native students. Beaulieu (2000) and the McDowell Group (2001) cited some of the factors that can be barriers

to success and must be mitigated in order to accomplish education reform in schools and districts serving Native students and to help students have a positive academic experience. In addition to high dropout rates, they pointed to high professional staff turnover and limited knowledge of the school staff about effective processes for school improvement in predominantly Native populations as barriers to success. The needs of a higher proportion of English language learners must be considered in some cases as well as issues of substance abuse, violence, and crime that can in some way touch the life of every member of a very small community. Further, they stated that community educational objectives for the retention of language and culture need to be honored in any education reform initiative within Native communities. Eisner (2004) cited overarching educational policies focused on homogenized results as inhibitors of education reform and success for students with diverse intellectual strengths. He said, "Good schools increase individual differences, not reduce them. Effective schools increase variance or individual differences among students" (p. 36). Benham Tye (2000) called the "deep structure of schools," meaning the embedded assumptions about how schools should operate, the cause of low performance by many students. She was referring to practices such as the age/grade structure that treat time as a constant—students have 10 months to master specific curriculum concepts identified for a given grade level. Individualized learning and time as a flexible concept are specific elements of the design of the QSM, in direct response to the research base.

R. Barnhardt (1992) and Demmert, McCardle, Mele-McCarthy, and Leos (2006) described characteristics necessary in school systems and school personnel for

success in an Alaska Native cultural setting. First, they said administrators needed to create an environment that would facilitate maximum "ad hoc" communication: a constant flow of knowledge between the school and community that allows for ongoing adjustment of action and plenty of opportunity for informal conversation. Second, school systems should practice participatory decision making in a way that allows community members to contribute their points of view without surrendering their uniqueness to do so. R. Barnhardt recommended that school systems be decentralized to the largest extent possible so that control and decision making reside in the local community where accommodations can be made to the physical environment and the culture of the community. Along with local decision making, community participation needs to be built into the system in meaningful ways so that a sense of shared ownership is developed, along with the cultivation of a shared unity of purpose (shared vision).

Rural Alaska school districts operate in a multicultural environment where the majority culture in the community is often Alaska Native. However, historically and currently, educators in rural Alaska are predominantly from a non-Native cultural background, meaning that cultural differences related to knowledge creation and use are common. This disconnect between the form of the Western school and Native students is discussed next.

2.2.3 Western-Style Schooling and Alaska Native Students

C. Barnhardt (2001) and Darnell and Hoëm (1996) stated that the development of Alaska's rural schools was based on an erroneous assumption that a Western form

of schooling would be successful with Native students. Kawagley (1995) noted that the implementation of a style of schooling with Alaska's Native people founded on Western beliefs and practices has not always complemented the Native worldview. Demmert, McCardle et al. (2006) echoed this sentiment by stating that the Western approach toward education did not foster or include the traditional Native style of knowledge transmission. The struggle between traditional Native ways of learning and the Western approach to schooling first identified in 1928 in the Merriman Report still seems relevant today. More than 20 years ago, researchers showed that differences between the home culture and the mainstream behaviors promoted by school can contribute to academic and social failure of the student (Heath, 1983; Ogbu, 1987). The continued disparity between the academic performance of Alaska Native students and their White counterparts suggests that both the cultural differences between the home and the school and the disparity between the pedagogical style of traditional Western schools and learning styles of Native students are reasons for the lower performance.

However, the issue of any specific Native learning style is a topic of review and debate. Several (Bland, 1975; Kleinfeld & Nelson, 1991; Stellern, Collins, Guitierrez, & Patterson, 1986) have argued that their research was inconclusive in showing that American Indian/Alaska Native students have a dominant learning style. Moreover, McIvor (1999) stated that there was no absolute or generic "Indian learning style." These researchers preferred Vygotsky's (1986) viewpoint that learning style is a result of the socialization process that occurs within society. There is, however,

research to support that learning occurs best when instructional pedagogy is in sync with the cultural personality of the students being taught (Greymorning, 2000). Hilberg and Tharp (2002), in their review of the literature on learning preferences of Native students, cautioned that "even in classrooms consisting of a single cultural group, as in the case of many reservation [or village] schools, teachers must use a variety of instructional strategies. *Effective teaching requires teaching individuals"* (p. 2, italics added). Sternberg (2006) concluded similarly that students taught using a variety of instructional strategies outperformed other students, saying that this allowed students to capitalize on their personal strengths to form cognitive schema for new information.

Pewewardy (2002) pointed to a "cultural personality" that influences the teaching and learning process for Native students. The cultural values of conformity to authority and respect for elders, taciturnity, and village and tribal social bonds and hierarchy are all rooted in teachings of community elders and are part of the framework for learning that many Native children bring to school. Sternberg (2001) defined learning styles as habitual patterns or preferred ways of doing something that are consistent over long periods and across a variety of activities. Hilberg and Tharp (2002), in their summary of research findings on the learning preferences of Native students, concluded there are four dominant characteristics or learning preferences. These include a global or holistic preference for organizing information (Stairs, 1999; Tharp & Yamauchi, 1994), visual representation of information (Lipiniski, 1989, 1990), a reflective style in information processing (Hall, 1991; McShane & Plas,

1994), and a preference for collaboration rather than competition (Scollon & Scollon, 1981; Tharp, 1989). It is important to note that the four styles do not include an auditory approach to learning. This is significant, as the traditional Western approach toward learning stresses an auditory learning style.

Learners who are global thinkers like to understand individual concepts within the context of the whole. In contrast, much of typical Western-style classroom instruction consists of analytic presentation of small pieces of information that are then aggregated to some much larger concept at a later point. R. Barnhardt and Kawagley (2005), in writing about the historical context for holistic learning in Native communities, said,

> Although Western science and education tend to emphasize compartmentalized knowledge that is often decontextualized and taught in the detached setting of a classroom … Indigenous people have traditionally acquired their knowledge through direct experience in the natural world. For them, the particulars come to be understood in relation to the whole, and the "laws" are continually tested in the context of everyday survival. (p. 11)

Global thinkers often prefer an overview of the "big idea" before discussing parts or details, like discussions that focus on overall themes and the use of visual representations. Individuals who prefer visual representations almost always perform better when they can see a picture or demonstration along with text or verbally presented information.

Reflective information processors adopt a "watch, then do" approach to learning. R. Barnhardt (1992), Demmert, McCardle et al. (2006), Lipka, Sharp, Adams, and Sharp (2007), and Tharp (2006) all agreed that educators must develop an understanding for the frame of reference toward knowledge in Native communities, namely its often tacit nature and the tradition of knowledge transfer through demonstration and observation rather than using words and written instructions. Tharp noted that traditional as well as contemporary Native American socialization emphasizes learning by observation. Of this learning strategy, he said,

> ...for a society to rely on observational learning, children are incorporated into the activity settings of the society. Technological cultures often require verbal explanation before children can understand adult activities; in the "observational learning complex" the adult behaviors can be understood with only occasional verbal explanation. (p. 14).

Lipka, Sharp, Brenner, Yanez, and Sharp (2005) called the observational learning described by Tharp "expert-apprentice modeling" and said that it was one of the oldest forms of instruction, along with joint productive activity. Lipka et al., based on their research with Yup'ik students and mathematics curriculum, viewed expert apprenticeship modeling "as a culturally responsive way to bridge explicit teaching of concepts and the independent application of complex skills by learners" (p. 33). Also, in traditional Native communities and homes, individuals often collaborate with others to solve problems and accomplish tasks (Tharp, 2006), a contrast to Western-style

classrooms where the dominant instructional style has students working independently despite all that has been written about the value of collaborative learning.

With the assumption that learning style is not random, and if the schooling process is to be effective, then the approach toward learning must include contextual material that makes a connection to the student's culture. Lipka et al.'s (2005) research on math instruction for Alaska Native students that includes contextual models (e.g., a fish rack) has shown an increase in students' learning when compared to the results of the more traditional Western style of math instruction with this same group of students. Barta et al. (2001) noted that a contextual approach to learning, one that includes culturally relevant curricula, is a necessary bridge between home and school. Sternberg (2006), reporting on studies conducted with students in both Alaska and Kenya, found that capitalizing on students' cultural strengths improved their achievement. In his work, researchers assessed students' creative and analytic abilities using questions that related to practical knowledge that was culturally relevant on tests that mimicked the hallmark features of standardized tests (written, objective, and multiple choice). Under those conditions, researchers found that students had a depth of adaptive knowledge and skills that was not apparent on standardized tests. He concluded, "Which students do well depends on what we test" (p. 31). Contrasting performance-based demonstration of knowledge with standardized tests, R. Barnhardt and Kawagley (2005) said,

> In Western terms, competency is often assessed based on predetermined ideas of what a person should know, which is then measured indirectly through

> various forms of "objective" tests.... In the traditional Native sense, competency has an unequivocal relationship to survival or extinction—if one fails as a caribou hunter, the entire family is in jeopardy. One either has or does not have requisite knowledge, and it is tested in a real-world context. (p. 11)

2.2.4 From Opportunity to Learn to Universal Competence

As noted in this section of Chapter 2, there were some historical differences in education in Alaska, especially for Alaska Native students and prior to the 1976 Supreme Court decision in the Molly Hooch case. Both in Alaska and nationally, education reform has resulted from a combination of legislation that established federal policy, government reports, research, and judicial action. Both in Alaska and the nation, as Wave 2 of education reform was engulfed by NCLB, the underlying philosophy of education policy changed from providing students with an opportunity to learn to one of universal competence with sanctions for systems that do not produce students who meet established standards of competence.

Goals 2000 contained a requirement that states develop Opportunity to Learn standards that were supposed to delineate the conditions necessary for students to learn. Opportunity to learn meant providing all students equal opportunity to reach ambitious outcomes. As Elmore and Fuhrman (1995) stated, however,

> Equality of opportunity has remained elusive. The primary goal of these varying efforts, assuring that all districts were relatively comparable in their ability to provide services, has not been reached. While finance equalization, compensatory programs, and other approaches have narrowed the gap in

> available services, they have not closed the gap as evidence in numerous court cases suggests. (p. 438)

Elmore and Fuhrman (1995) described two anchor points at opposite ends of the spectrum of options for addressing the opportunity to learn. The first option they called the "input-guarantee" option—addressing resource inequalities in a systematic and sustained way. Advocates of strategies to equalize school funding argued that layering performance and outcome standards on top of current resource inequalities among schools almost assured that disadvantaged or low-achieving schools would stay that way. The opposite view was called the "performance guarantee" perspective by Elmore and Fuhrman and ultimately became typified by the accountability measures found in NCLB and the viewpoint that accountability itself would act as enough incentive to increase student performance. Eisner (2004) expanded the idea of equity and opportunity to learn to include quality of learning by saying,

> there is something intuitively right about recognizing that people differ in the way they function best. There is something socially right about the idea that children … should be given an opportunity to shine in classrooms in which their particular strengths can be nurtured and made public. In both of these ideas, equity … requires more than having the opportunity to cross the school's threshold; it includes having opportunities once that threshold is crossed to find a setting that is sensitive and responsive to the forms of intelligence individuals possess. (p. 33)

With the passage of NCLB, federal policymakers adopted the philosophy that all students can experience high achievement and that schools can make a difference in students' achievement regardless of family background, which Porter (2006) called a philosophical shift from opportunity to learn to universal competence. In an opportunity-to-learn environment, responsibility for ensuring learning occurred ended when all of the conditions for learning had been provided: facility, instructor, curriculum, and so on. The students' job was to take advantage of what was provided, and if they couldn't or wouldn't, it was their fault that learning didn't occur, not the fault of the system. While NCLB requirements have brought fresh legal challenges related to opportunity to learn in many states, Alaska included (*Moore v. State of Alaska*), the policy focus has broadened to include the expectation of higher standards of achievement attained by all students.

Universal competence was the philosophy embodied in the effective schools movement and now adopted in the accountability measures of NCLB. It is the philosophy that all students must achieve certain levels of learning, and that the system has responsibility for ensuring that they do by the year 2014. Equitable funding to achieve universal competence was the substance of *Moore v. State of Alaska* (2007), still pending further court action. The question is whether the core technology exists within educational systems to deliver on the goal of universal competence. An additional question in rural Alaska communities is whether universal competence can be achieved in a culturally responsive manner within the "third space" described by Lipka et al. (2007). The QSM is one example of comprehensive school reform that

may provide an effective answer to these questions (Coladarci et al., 2005). Table 2.4 presents a timeline of the state and national education reform initiatives, reports, and legislation just discussed and situates them within the philosophical framework of opportunity to learn and universal competence.

Table 2.4 A Timeline of Education Reform Initiatives, Reports, and Legislation, 1965–2007

	Year	Name	Type	Reform strategy/type
Opportunity to learn	1965	Passage of the Elementary and Secondary Education Act (ESEA)/Title I	Legislation	Established the philosophy of a right to equal opportunity to learn
	1966	*Equal Education Opportunity Survey* (Coleman Report)	Report	Found that the single greatest factor in student learning was the home
	1974	*Youth: Transition to Adulthood*	Report	Called for instructional changes
	1976	Settlement of Alaska "Molly Hootch" case	Judicial	Found that rural students did not have opportunity to learn; mandated high schools in rural Alaska villages and resulted in 23 new school districts
	1980	Creation of the U.S. Department of Education	Federal	Established a Cabinet-level position to oversee education policy
	1982	Effective Schools Research (Edmonds, Lezotte)	Report	Correlates of Effective Schools
	1983	*A Nation at Risk*	Report	Called for changes in school structure
	1984	*A Study of High Schools* (Sizer, NASSP)	Report	Called for whole-school restructuring
	1990	*Goals 2000*	Report	Both bottom-up and systemic reform; voluntary standards and accountability
	1991	SCANS Report	Report	Outlined skills students needed in preparation for work
	1992	Alaska Onward to Excellence	Reform	Promoted community voice and involvement in reform
	1994	Reauthorization of ESEA Title I	Legislation	Funding tied to accountability and standards
	1994	Comprehensive School Reform (CSR)	Legislation	Nine elements of school wide reform based on research encoded into the ESEA reauthorization, with funding for implementation
	1994	*Prisoners of Time*	Report	Called for changes in instruction and learning
	1996	Alaska Quality Schools Initiative	Report	State-level development of voluntary student learning standards
	1996	Alaska Rural Systemic Initiative	Reform	Five initiatives for creating culturally appropriate education reform in Alaska
	1998	Alaska Cultural Standards published	Report	Voluntary cultural standards for Alaska students
	1998	Alaska HSGQE	Legislation	Mandated competency testing for high school graduation
Universal competence	2001	No Child Left Behind (NCLB)	Legislation	Mandatory testing and reporting; school and district accountability
	2003	*A Quiet Crisis: Federal Funding and Unmet Needs in Indian Country*	Report	Federal report highlighting that Native students still do not have equal opportunity to learn
	2007	*Tough Choices or Tough Times*	Report	Call for large-scale systemic change
	2007	*Moore v. State of Alaska*	Judicial	Decision that the State is not adequately funding or monitoring education (decision is on hold and will be reviewed)

2.2.5 Summary of Alaska Education Reform

Despite an increased understanding of the educational needs of Alaska Native and American Indian students, in the report titled *A Quiet Crisis: Federal Funding and Unmet Needs in Indian Country* issued by the U.S. Commission on Civil Rights in 2003, the following conclusion was drawn with regard to the education of Native American students:

> As a group, Native American students are not afforded educational opportunities equal to other American students. They routinely face deteriorating school facilities, underpaid teachers, weak curricula, discriminatory treatment, and outdated learning tools. In addition, the cultural histories and practices of Native students are rarely incorporated in the learning environment. As a result, achievement gaps persist with Native American students scoring lower than any other racial/ethnic group in basic levels of reading, math, and history. Native American students are also less likely to graduate from high school and more likely to drop out in earlier grades. (p. xi)

The Commission report stated that opportunity to learn and cultural factors related to learning, including learning preferences associated with Native education, must be addressed in any successful attempt at education reform. Lipka et al. (2007) used the term *third space* to describe a setting where two cultures evolve into a positive new identity that bears the influence of both of the parent cultures. They said,

> Classrooms have the potential for being these "third spaces": not necessarily those of the dominant culture, nor in a one-to-one correspondence with the

> local indigenous or ethnic minority culture. These third spaces have the potential to become productive uncharted zones between school and local cultural knowledge and norms. (p. 97)

This would seem to be especially important in Alaska, where nearly a quarter of the school-age students are Native. In an education culture that emphasizes accountability through measurement of student achievement on standardized tests, students have the best chance of success when they understand the "cultural capital" that is being tested (English & Steffy, 2001). Eisner (2004, p. 32) summarized this by paraphrasing Plato: "what is honored in a culture will be promoted there. The kind of intelligence a culture prizes influences its development." As long as standardized tests measure someone else's cultural capital, the third space described by Lipka et al. may provide the bridge to achievement for Alaska Native students.

The QSM embodies many of the seven principles of the Standards for Effective Pedagogy (Tharp, 2006) that were advanced as effective education practices for underachieving, placed-at-risk groups across cultures (e.g., Alaska Native students). A 3-year study of rural school reform conducted by the Northwest Regional Educational Lab and University of Alaska Fairbanks researchers (Kushman & Barnhardt, 1999) recommended the following strategies as means for increasing educational achievement for Alaska Native students, all of which can be found in the components of the QSM:

- Provide role models and support for creating a positive self-image to which students can aspire.
- Parental involvement needs to be treated as a partnership, with more shared decision making.
- Strengthen curriculum support for culturally responsive, place-based approaches that integrate local and global academic and practical learning.
- Encourage the development of multiple paths for students to meet the state standards.
- Sustainable reform needs to be a bottom-up rather than a top-down process and has to have a purpose beyond reform for reform's sake.

Ultimately, any systematic educational reform effort can be either facilitated or hindered by its organizational structure. The next section of Chapter 2 reviews the literature related to organizational structures, particularly implementation structures, and then presents the concept of structural poses. Organizational theory is then related to education reform, especially in the cultural context of rural Alaska. Knowledge management plays a critical role in the functioning of any organization; the role of knowledge management and knowledge as the core technology of education are also discussed in the next section.

2.3 Systems Theory and Organizational Structures

In the effective schools research (Edmonds et al., 1979) that was part of Wave 2 education reforms, the individual school was emphasized as the unit of change. As Wave 3 surged, researchers realized that to sustain school improvement required a systems view of the school district as the unit of change. Lezotte (2003) summarized this shift in thinking:

> Organizational management theories provided significant additions to effective schools research and policy. The concepts of decentralization and empowerment, the importance of organizational culture, and the principles of total quality management and continuous improvement have added important dimensions to our understanding of effective schools. (p. 3)

Systems thinking provides a helpful way to look at school reform because no single event, problem, or action is seen in isolation but instead is viewed as a component of larger structures. According to Senge et al. (2000), "a system is any perceived whole whose elements 'hang together' because they continually affect each other over time" (p. 78). In fact, the word *system* comes from the Greek verb *sunistanai*, meaning "to cause to stand together." This next section reviews the theory and research related to education as a system and the core technology of teaching and learning as a coproduced knowledge-related service for individual and social benefit.

2.3.1 Implementation Structures

To adequately study the implementation of a complex initiative like the QSM where individuals within different systems are constantly interacting, it is helpful to use Hjern and Porter's (1981) description of interacting structures, particularly the implementation structure, and Porter's (1990) description of structural poses. There are at least five different types of structures that interact related to the QSM, described by Porter. They are

1. *Government*, which includes federal, state, and local governance and policy functions. Two of the major social roles in this organization include citizen and elected official. It is important to note that "values within government structures focus as much on the rights of citizens and the process of decision making as on the actual products of those decisions" (Porter, 1990, p. 10). Related to the changing relationship between government structures and organization structures of schools, Osthoff (2003) wrote, "The relationship between schools and external agencies has changed as new ideas about the purposes and nature of schooling gain acceptance.... As [education] reform goals shift, the influence of any given external agent depends on the nature and extent of its power and authority, and on its ability to adjust quickly and effectively to the changing needs of schools, teachers, and students" (p. 46).
2. *Organization*, which includes not only a school district, but also organizations and businesses with which it interacts. Organization structures are also found within departments of the school district. Organizations are characterized by

hierarchy, division of labor, a meritocracy in middle management, and career personnel. The values of an organization revolve around the need to produce—in the case of school districts, the need to produce educated students.

3. *Professional*, which includes teachers, administrators, and specialists. Individuals belong to this structure by virtue of their education and training in specialized knowledge. Hierarchical relationships are specifically disvalued in this structure, where individuals achieve leadership status as a result of additional learning and training. According to Porter (1990), the more dedicated an individual is to his or her profession, the less likely he or she is to be involved in government or organization activities that are not directly related to his or her professional practice. For example, a teacher highly dedicated to students and spending maximum time in teaching, tutoring, or mentoring is less likely to commit time to a district policy revision committee.
4. *Market structures* involve the concepts of buyers, sellers, brokers, consumers, and the exchange of goods and services. Oftentimes, the exchanges are unconscious and unplanned, and, in the case of knowledge transfer, contain intangible elements. As Deming, Juran, and other quality experts have shown, markets operate most efficiently when customers' wants and needs are satisfied. The hallmark values of a market system are competition and freedom of private enterprise. Cross and Prusak (2005) provided a good description of knowledge transfer within a market structure.

5. *Implementation structures* are like a hybrid of the first four types of structures rather than an amalgamation of them. Implementation structures have distinct features: They are organized to accomplish a specific task (in this case, the implementation of the QSM); there is no hierarchical pattern to the structure; and professionals and markets are guided by the specific task to be accomplished rather than more general activity. Porter (1990) summarized their features related to individuals and interaction of individuals: "Implementation structures comprise individuals who set goals, mobilize resources, coordinate their actions, possess specialized expertise, and produce goods and services" (p. 18). Related to interactions among people he said, "Dominant values that guide relationships among individuals within implementation structures are nonhierarchical, consensual, voluntary, based on shared values, professional competence, and nonterritoriality" (p. 18). Implementation structures share some features of the hypertext organization described by Nonaka and Takeuchi (1995).

The features of implementation structures are important to consider when conducting an analysis to determine successful implementation or to describe the degree of implementation of the QSM. Porter (2007) said, "For a prescriptive theory to be effective, it must be descriptive of the reality it intends to modify" (p. 22). For implementation structures to be effective, the other constituent systems or structures must also operate effectively (i.e., government, the school district and business

organizations, professional, and market structures). What seems to be the most important tie that binds individuals to the implementation structure is a set of shared values (called Shared Vision in the QSM).

2.3.2 Structural Pose

There are different tasks associated with each social structure. Within the five social structures, individuals assume different roles and move from being a citizen to a professional to a consumer, depending on the task to be completed and numerous other conditions as services such as education are coproduced. Gearing (1968), in his anthropological work studying political activity within Cherokee Indian villages, coined the term *structural pose* to describe the way individuals participated in structures and adopted a code of behavior and expectations specific to each structure. He noted that individuals moved effortlessly between structures and the norms required to function in each one. According to Gearing, the concept of structural pose is useful for describing the behavior of individuals within structures and helps to explain why an action might be considered good in one setting but not in another.

Porter (1990) used the structural pose construct to describe how individuals can concurrently assume more than one role in the various structures that interact within implementation and how, as education services are coproduced, individuals move from one structural pose to another effortlessly. An example of the structural pose concept within the QSM would be an Alaska Native paraprofessional in a village school who is also a parent and community member. The paraprofessional interacts with teachers as a professional, acts as a "seller" in the knowledge market when she

provides culturally specific information to the teachers in her building, further acts as a consumer of education services as a parent, and participates in the organization of the school district as an employee who is supervised by the teacher and building administrator. Within the community, she may have a role or responsibility in the tribal council and is impacted by the federal and state NCLB accountability requirements both as a professional and as a parent.

In an implementation structure such as the QSM of education reform, professionals act as "street-level bureaucrats" (Lipsky, 1980), the individuals ultimately responsible for how education reform and policy unfold in schools and the district. As street-level bureaucrats, teachers and administrators have significant discretion over decisions about implementation and freedom to invent new solutions to nonroutine problems. Street-level bureaucrats also face ambiguity and uncertainty about whether their actions will lead to the desired outcome. All of these factors combined can mean that implementation achieved looks different than the policy or reform in theory. Based on their study of policy and reform implementation, Maynard-Moody and Musheno (2003) asserted that street-level workers actually make policy choices rather than simply implementing the decisions of elected officials.

2.3.3 Organizational Structure Theory Applied to Education

The QSM provides a guide for both strategy and structure for education reform. Chandler (1962) defined *strategy* as the long-term goals and objectives of an organization and the actions adopted and resources allocated as necessary for carrying out the goals. The QSM is designed to be driven by a locally determined shared vision

that sets the course for subsequent action. Chandler further defined *structure* as the design of the organization, with two notable features. Structure includes lines of authority and communication, and data and information that pass through the lines of authority and communication. According to Chandler, "such lines and such data are essential to assure the effective coordination, appraisal, and planning so necessary in carrying out the basic goals and policies and in knitting together the total resources of the enterprise" (p. 14). The QSM, however, is heavily reliant on the development of a less bureaucratic organizational structure where leadership is shared and where there is strong support for fluid sharing of the knowledge assets of the organization, more consistent with the implementation structure described by Porter and Nonaka and Takeuchi's hypertext organization.

Porter (2006) likened the NCLB accountability measures to the business structural requirements that gave rise to the multiple-division design described by Chandler (1964). Chandler described the problems of industrial organizations in managing and coordinating the activities of increasingly complex businesses that were becoming geographically dispersed and diversified in terms of the products they produced. This led large companies to adopt multidivisional structures (sometimes referred to as M-Form) having as their most notable identifying features decentralized decision making and control. With NCLB, federal policy and regulations stipulate the necessary results (an example of centralized control), yet the decision making for achieving the results has been decentralized through the states to individual school

districts and further to individual schools. Accountability for results resides with individual schools and the school district, while sanctions are the tool for compliance held by state and federal government.

The debate over the best organizational configuration for schools—whether they should be centralized or decentralized—resides alongside debates over curriculum, teaching strategies, and standardized testing. In the debate over configuration, proponents of centralization such as Tucker and Codding (1998) have favored stricter curricular and testing standards at the national level. School-based management was favored by Mohrman and Wohlstetter (1994), who were proponents of decentralization. Chubb and Moe (1990) were advocates of even more decentralization in the form of government-funded school vouchers and charter schools. Ouchi et al. (2003) cited a large body of literature that said higher student achievement was linked to decentralized organizations. In contrast, other researchers felt that because schools were loosely coupled organizations, structure did not have a relationship to performance. Swanson and Stevenson (as cited in Ouchi et al., 2003) explained,

> According to this perspective, the technical work of schooling (teaching and learning) is only loosely tied to the administrative structure of the school. The work of instruction is performed within individual classrooms that are substantially isolated from the teaching practices in other classrooms, even within the same school. (p. 7)

Many school systems are a hybrid type of decentralized or M-Form organization that centralizes some activities to achieve economy of scale but decentralizes decisions to the subunits and provides policy guidance and broad accountability from the central office. In an M-Form school system, most of the major functions of the central office are delegated to individual schools, which are fairly autonomous. For example, schools make decisions about which teachers and support staff to hire, the proportion of teachers to classroom aides, how to use other full- or part-time staff, which supplies to purchase, how much to spend on computers, and who goes to which training. Williamson (1991) thought that M-Form organizations outperformed other types of organizations. When subunits of an organization are geographically dispersed, as is the case in rural Alaska school districts, the M-Form is more likely to appear. Williamson (as cited in Ouchi et al., 2003) said decentralization of decision making is especially important when each operating unit faces unique conditions. He also stated that performance is easier to monitor in M-Form organizations because the subunit has control of most of the important decisions. The central organization or district office attempts to measure subunits through summary statistical indicators such as attendance rates and student achievement on standards-based assessments. The success of education reform efforts in these geographically dispersed subunits (schools) is dependent on a well-functioning knowledge market and knowledge management strategies.

Ouchi et al. (2003) researched Williamson's theory that M-Form school organizations outperform more centralized types. For their study, they selected nine school systems, including the three largest in the United States (New York City, Los Angeles, and Chicago) as well as Catholic school systems. They concluded through a number of quantitative measures that M-Form systems were the most effective both financially and educationally. In their study, vertical central control was still present in the M-design districts in the form of reported performance measures from schools.

2.3.4 Organizational Structures to Support Cultural Inclusion

R. Barnhardt (1992) described four characteristics and organizational practices that facilitate responsiveness to cultural diversity: participatory decision-making, a decentralized authority structure, a distributive communication system, and a loosely coupled organizational framework. Related to participatory decision making and knowledge management systems, R. Barnhardt said large-scale, centralized, and top-down communication structures and practices are less likely to garner participation by Alaska Natives in an institution such as a school than networked communication at the local level. In advocating a loosely coupled organization, R. Barnhardt cited the uniqueness of each rural village and group of residents whose needs must be met by the school.

Peter Drucker concluded, in an interview looking back over his life's work with organizations that the age of the single "right" organizational structure is over and that today an organization's task or mission must determine its structure. Many organizations need to rely on alliances with other organizations, universities, and

government. Drucker said (in Modic, 2006), "The 'central management challenge' of the next decade will be to learn to fit the organization to the tasks, the mission, the technology, and the culture of the company" (p. 11). Thompson (2003) claimed that monolithic bureaucracies with centralized decision making are not typical of modern complex organizations. He explained by saying,

> Where boundary contingencies or internal interdependencies are numerous, organizations need bounded rationality for local handling of those uncertainties. Where both internal processes and boundary transactions are highly variable [as in education] the bounding of rationality requires structural decentralization, the creation of semiautonomous subsystems. (p. 161)

R. Barnhardt (1992), Williamson (1991), Ouchi et al. (2003), and Thompson (2003) all said that appropriateness of design and structure for any organization have to account for the variables and uncertainties faced by the organization and that both design and evaluation of its effectiveness are bound to be influenced by the perceptions and beliefs (mental models) of those participating in the process. The writings of Thompson, Drucker, and R. Barnhardt all seem to point to best practice that is incorporated into the design of the QSM, specifically shared decision making and local control through the shared vision and continuous improvement processes.

2.3.5 The Relationship between Organizational Structure and Knowledge Management

If local school districts (and their municipalities) and individual schools are multilevel organizations with multilevel governance problems, then the issue is how to

get subordinate units to operate in concert with each other when there are strong local pressures. Of this paradox, Elmore and Fuhrman (1995) wrote,

> The problem is complicated by the additional fact that subordinate units (schools) usually have better information about how to adapt general policies to their immediate environment ... Governments face a particularly difficult version of this problem because local governments have significant local autonomy and well-organized political constituencies of their own. *Local [schools] are less likely to adopt than to adapt higher-level policy [and change initiatives]. One level of government cannot so much control another as bargain with it and attempt to influence it through persuasion and exchange of benefits.* (p. 439, italics added)

Knowledge creation has "profound implications" for organizational structure (Nonaka & Takeuchi, 1995, p. 160). Knowledge acquisition and use are critical for organizational success. Organizations operating with a traditional bureaucratic structure face some shortcomings related to effective knowledge management: Bureaucratic control can stifle individual initiative and can be dysfunctional in times of uncertainty and rapid change. Bureaucracies can also generate resistance and tension, and most of all hinder motivation of organizational members. For these reasons, Nonaka and Takeuchi, based on their long-term work with primarily Japanese organizations, envisioned a different organizational structure that fosters all parts of the knowledge cycle.

Nonaka and Takeuchi (1995) praised the common characteristics of newer organizational models. They have a flatter hierarchy, assume a constant dynamic rather than static structure, empower employees to create customer satisfaction, emphasize the importance of competencies, and recognize intellect as the foremost asset of the organization. Yet Nonaka and Takeuchi warned that "when configured improperly, they can be less effective than the old-fashioned bureaucracy" (p. 162).

The organizational design proposed by Nonaka and Takeuchi (1995) for facilitating knowledge work treats some of the features of bureaucracy and task force models as complementary rather than mutually exclusive. The goals are to simultaneously maximize organizational efficiency and results and provide the greatest degree of local flexibility. They used the metaphor of "hypertext" organization to explain their model, with transparent, interconnected layers. The business system layer in their model is the most traditionally bureaucratic, while the local project team forms a more fluid top layer and both are anchored by the knowledge base layer. In the knowledge base layer, organizational knowledge generated in the business and project layers is recontextualized and recategorized. Nonaka and Takeuchi's hypertext organization is an open system, featuring continuous and dynamic interaction with stakeholders. "The key characteristic of a hypertext organization is the ability of its members to shift contexts, moving easily in and out of one context into another" (Nonaka & Takeuchi, p. 171). The contexts described by Nonaka and Takeuchi (business system, project team, and knowledge

base) are analogous to Porter's social structures described earlier. Likewise, shifting contexts is very similar to adopting the appropriate structural pose. Nonaka and Takeuchi provided the following benefits for the organizational design they envisioned:

> A hypertext organization, which is the dynamic synthesis of both the bureaucratic structure and the task force, reaps benefits from both. The bureaucratic structure efficiently implements, exploits, and accumulates new knowledge through internalization and combination, while the task force is indispensable for generating new knowledge through socialization and externalization. The efficiency and stability of the bureaucracy is combined with the effectiveness and dynamism of the task force in a hypertext organization. [And] it adds the knowledge base layer that serves as a "clearinghouse" for the new knowledge generated in the business-system and project-team layers. (p. 170)

While Nonaka and Takeuchi's model seems to eliminate or reduce the amount of boundary-spanning functions in an organization, the reality is that many school organizations have boundary-spanning employees who must reconceptualize their responsibilities when decision making is decentralized to the local unit. Chou (2004) investigated the changing role of district office staff when increased decision-making power was vested in schools as part of systemic reform and decentralization. Her study was part of a larger comprehensive study of school reform by Wohlstetter and

Mohrman through the Consortium for Policy Research in Education. Chou concluded that when decision making was transferred to schools, the role of central office staff became that of facilitators, coaches, knowledge brokers, and service providers. The complexity of the power transfer was underestimated, she found, and central office staff struggled with the perceived erosion of power. When the transfer of power was successful, the district office became an information sharing center and a provider of technical assistance and professional development to schools. Corbin, McNamara, and Williams (2003) found in a similar study of numeracy coordinators in the United Kingdom that boundary-spanning individuals struggled to balance their role as neutral knowledge conduits with the political basis for their role (i.e., change-seeking). In their study, they also cited tension related to identity and power, similar to Chou's findings.

Honig (2006) found that boundary spanning by central office administrators may require skills that are beyond traditional education administration preparation. She went on to say that while central office administrators and specialists can fill some key needs related to knowledge functions during reform implementation, they also often have some important weaknesses. First, these individuals do not have the depth of local knowledge that a site administrator does, and second, they lack control over local decisions and personnel. Similar to Chou (2004), Honig found that central office administrators have two important functions related to policy reform. First, they search for and gather new information from outside the organization, and second, they work

to incorporate that information into organizational routines to meet the organizational goals.

Honig (2006) noted that the limited authority of central office boundary-spanning administrators influences their ability to use the knowledge and information they gathered. She said their role is to "help other organizational members use information by translating the information into forms that the other decision makers may consider accessible and useable" and that "translation fundamentally involves absorbing uncertainty from the information" (p. 361).

2.3.6 Organizational Leadership for Knowledge Activity

Choo said, "Organizational decision making is rational in spirit (and appearance) if not in execution: the organization is intendedly rational, even if its members are only boundedly so" (1998, p. 13). The role of administration in the organization is to provide the boundaries to make rationality possible within the organization. According to Thompson, "bounded rationality involves not only the reduction of complexity by the elimination of uncertainty or provision of certainty equivalents, but also the incorporation within the arena for action of the variables necessary for purposive action" (2003, p. 162). Simon (1997) called this controlling the decision premises, as distinct from controlling the actual decisions themselves.

Drucker (as cited in Watson, 2002) claimed that many top executives lack information literacy necessary for organizational decision making, saying, "They know how to get data. But most still have yet to learn how to use data" (p. 60). Related to quality and performance information, Drucker named four critical questions that

must be answered: What information is due? To whom is it due? When should the information be presented? And, in what form should it be presented?

Nonaka (1994) and Nonaka and Takeuchi (1995) placed a great deal of emphasis on the role of top and middle management for knowledge creation in their "middle-up-down" management model. They contrasted middle-up-down management with a traditional bureaucracy where information filtered top-down and the entire organizational structure was designed to support a hierarchical pattern of information processing. In a traditional bureaucratic model, according to Nonaka (1994), the information processing by middle and lower level members of the organization had little relevance to organizational knowledge creation, and the information generated by top managers was solely for implementation, not for the creation of new knowledge. By contrast, Nonaka's middle-up-down management is characterized by a wide scope of cooperative relationships between top, middle, and lower managers for the purpose of knowledge creation. No one major department or group of experts has the exclusive responsibility for creating new knowledge—the responsibility and creative benefit are shared by all. In Nonaka's model, top managers provide the "vision for direction," along with a timeline for its accomplishment. Middle management translates the vision of top management into midrange visions that are accomplished by work groups. Both top and middle managers provide a conceptual framework for purposeful knowledge creation without limiting the scope by limiting knowledge resources to those responsible for the work.

Honig (2006) described the conditions required for the knowledge activities described by Nonaka to occur. She said that these individuals who span organizational boundaries must have the ability to understand the language of multiple professional communities in order to effectively identify relevant information and translate it into forms that different audiences can use. She cautioned,

> Boundary spanning professionals who are primarily fluent in external languages tend to search well but to be relatively ineffective at helping their organization use the information they collect; other boundary spanning professionals who are fluent in their organization's language tend to be skilled at use but lack the information to ground use. (p. 361)

Applied to the QSM, this could describe a principal or administrator who understands the unique terminology and standards-based structure of the model but is unable to help teachers design standards-based instruction or explain to parents how students achieve proficiency.

In Nonaka's middle-up-down model, middle managers act as a bridge between top managers who articulate the "dreams of the organization" and lower managers who are immersed in the day-to-day reality of the organization. Nonaka (1994, p. 31) contrasted top-down and middle-up-down management as shown in Table 2.5.

Table 2.5 Contrast of Top-Down and Middle-Up-Down Management Features

	Top-down	**Middle-up-down**
Who—Agent of knowledge creation	Top management	Self-organized teams (with middle managers as team leaders)
Resource allocation	Hierarchical	From diverse viewpoints
Pursued synergy	Synergy of profit	Synergy of knowledge
Organization	Big, powerful HQ, use of manuals and rules for structure	Team-oriented, affiliated groups
Management processes	Leaders in command, emphasis on information processing, chaos not allowed	Leaders as catalysts, create organizational knowledge, create/amplify chaos/noise
Accumulated knowledge	Explicit, documented, computerized	Explicit and tacit, shared in diverse forms

According to Nonaka (1994), middle managers mediate between "what is" and "what ought to be." Middle managers "serve as team leaders who are at the intersection of the vertical and horizontal flows of information in the company" (p. 32). Further, Nonaka said,

> The most important knowledge creating individuals in this model are neither charismatic top managers nor the entrepreneur-like lower managers, but every employee who works in association with middle managers ... They work as a bridge between the visionary ideals of the top and the often chaotic reality of the front-line of the organization. (p. 32)

Applied to education, Nonaka's view would hold that school principals and teachers are the most important knowledge-creating leaders of a school district, in addition to their role as street-level implementers of education reform.

Leonard (1995) cited six characteristics of leaders that support knowledge management activity. The first is an enthusiasm for knowledge, which she described as respect and encouragement for the accumulation of knowledge as a legitimate undertaking. Leaders with enthusiasm for knowledge are curious and see knowledge building as something fun. The second characteristic is a drive to stay ahead, which means staying knowledgeable about the latest and best ideas, as well as staying ahead of and anticipating customer demands and needs. The third important characteristic is an appreciation for the "iterative, return-loop nature of all activities" (p. 263). Good leaders never walk away from an activity and assume it is finished and completed, but instead continue to support it with management encouragement and attention. The last three characteristics of leaders who support knowledge management include emphasis on higher order learning, good listening and learning skills, and the view that development of the organization's core technology (in this case, teaching and learning) is a continuous process.

2.3.7 The Core Technology of Education

The technology of education rests on abstract systems of belief about relationships among teachers, curriculum, and students. The potential problems begin to arise when the beliefs are operationalized. Education is an example of intensive technology, where both parties (educator and student) are reciprocally interdependent

in the production of services (results). It is called a custom technology because each time all of the right ingredients (capacities) have to be available, accessed, and used in amounts and ways specific to the individual situation (Thompson, 2003, pp. 17–18). For example, a classroom teacher calls in a special education teacher to administer a diagnostic test and they together determine the best curriculum and teaching strategies for a particular student. The education of this student may depend on the teacher consulting with other individuals and accessing other resources as well. Each specific case (the education of a single student) defines which component activities are necessary and in what combination from the whole group of possibilities within the organization.

The core technology of teaching and learning demonstrates the concept of reciprocal interdependence, where the actions of both the teacher and student must be adjusted to the actions of the other (Thompson, 2003). The actions of the teacher and student are synched through coordination by mutual adjustment, which requires a high degree of communication and decision making. Reciprocal interdependence is the reason that tutoring and small classes are more effective than large lectures and distance education in education. Reciprocal interdependence is the most costly way for organizations to achieve stated results but is the norm for education.

The core technology of education—the teaching and learning interchange—is coproduced. If learning is the outcome of the delivery of teaching services, the student must be involved (engaged) for the exchange to occur successfully. The teacher

supplies instruction tailored to the student, guidance, and encouragement, but the teacher and student must work together to increase the student's knowledge. Whitaker (1980) distinguished between individual and group participation in coproduction and defined three types of coproduction involving individuals. Broad-scale citizen participation is found at the policy level, where groups of individuals may band together to influence the content of policy during its development. A different kind of group involvement comes during policy implementation, when citizens may participate passively by simply paying their taxes (to support a federal program for the general good). Another example of coproduction of policy on a large scale is not so passive—the implementation of NCLB rules and requirements. It might be argued that the coproduction of NCLB outcomes is happening through numerous mutual-adjustment activities.

Whitaker's (1980) three types of coproduction can all be seen in education, but it is the third type (citizen/agent mutual adjustment) that occurs within teaching and learning:

1. *Citizen requests for assistance*—This type of coproduction takes place only when individuals or groups ask for services. Examples in education might include application for free and reduced lunch, or parents requesting that their child be tested for the gifted education program. This type of coproduction is also usually marked by a high degree of rules used to determine the "fit" between the request and

some predetermined conditions. Citizen requests for assistance may have an influence on the distribution of services and resources to a community.

2. *Citizen provision of assistance*—This type of coproduction relies on citizens cooperating with service providers and actually helping in the design and/or delivery of services to achieve a common goal. In traditional Alaska Native villages, an example was successful hunters or fishermen who shared their bounty with the elderly and other community members unable to hunt and fish. Within the QSM, this type of coproduction would be typified by broad community participation in development of the shared vision, volunteerism as a mentor for a student's Individual Learning Plan goals, and expert-apprentice modeling (Lipka et al., 2005). Whitaker noted the power of a constituency in this type of coproduction by saying, "One way for citizens to indicate lack of agreement that a policy [or school reform] is good is to fail to cooperate. If enough citizens withhold their assistance, a project based on cooperation cannot succeed" (p. 244).
3. *Citizen/agent mutual adjustment*—This type of coproduction is important when the goal is to modify the recipient's behavior (or knowledge). It involves joint consideration of a problem or situation and development of a common understanding of what to do about it.

> Along the way, expectations and actions are modified, involving a high degree of communication. Feedback is integral to the process. In this case, Whitaker said that both the student and teacher "share responsibility for deciding what action to take. Moreover, each accords legitimacy to the responsibility of the other" (p. 244).

Whitaker pointed out that coproduction via mutual adjustment does not necessarily mean the interaction of equals in terms of knowledge or other resources. In the teacher and student example, a teacher clearly has greater skill and knowledge and even authority to be proscriptive. But authority does not work to gain mutual adjustment because the student has free will to participate (motivation). Instead, in mutual adjustment, authority is shared—a teacher does not relinquish professional authority but agrees to share it with the student, who has free will and choice over whether to participate in the transaction. Research showing the positive relationship between teacher expectations of students and student achievement, and other research showing a correlation between students' perception of teachers as capable and students' willingness to commit to rigorous learning are examples of the importance of coproduction by mutual adjustment.

Alford (2002) distinguished between citizens, volunteers, and clients in a manner similar to Whitaker and then elaborated on the motivators that would elicit coproduction. They are intrinsic satisfaction, desire for group affiliation and belonging (solidarity), and collective values "for the good of the group." Alford noted that in

addition to motivation, clients need to have the ability to coproduce; organizations aid in this process through simplification of complex work and by providing training, advice, or help to clients. Sanctions serve as another motivator for coproduction or at least compliance, albeit not a satisfactory one, as it is tied to avoidance of punishment. Alford called sanctions deficient as motivators of positive behavior because they send signals to the client that s/he cannot be trusted to coproduce without some sort of enforcement. Alford found that "sanctions are destructive of clients' voluntary impulse to contribute ... The end result is that clients experience the organization's enforcement as arbitrary or as bound up in complex rules" (p. 43).

Within education, the accountability requirements of NCLB act as sanctions to create a group of contingently compliant clients. Contingently compliant clients coproduce, either willingly or grudgingly, because of the sanctions that lurk in the background. Because the sanctions occupy the background space, clients have the opportunity to participate willingly. Sanctions are only invoked or applied as necessary. In this case, sanctions have the function of reassuring clients who do willingly contribute time and effort that the process is inherently fair. In other words, they are not "suckers" who are coproducing more than the rest (Alford, 2002). The coproduction of education can be particularly challenging in cross-cultural settings such as rural Alaska with a "long tradition of the delivery of educational services from an external benefactor to an indigenous and presumed indigent beneficiary, the Alaskan Native" (R. Barnhardt, 1977, p. 1). As Porter (2007) stated, "Significant

contributing actors in the coproduction of education services are outside the authority of teachers, principals, and school superintendents" (p. 1). This reality makes decentralization, shared decision making, and community participation even more important as components of education reform.

The culturally relevant cognitive apprenticeship (Lipka et al., 2005) discussed in the last section has value for its potential to change the dynamics of coproduced education through increased motivation. Successful coproduction of education cannot exclude cultural factors within motivation when universal competence is the expected end result (Porter, 2007).

Increasingly, in the current wave of education reform that calls for systemic change, school districts are relying on business concepts related to quality in addition to those related to organizational structure. The concepts of quality, high performance, customer satisfaction, and results have appeared in the SCANS Report (SCANS, 1991), *Tough Choices or Tough Times* (New Commission on the Skills of the American Workforce, 2007), and *A Nation at Risk* (National Commission on Excellence in Education, 1983). The concept of quality and the Baldrige National Quality Award, designed to measure quality, are discussed in the next section.

2.4 The Quality Perspective and the Malcolm Baldrige National Quality Award

In 2001, the Chugach School District received the Malcolm Baldrige National Quality Award, becoming one of the first two educational organizations recognized

with the award. The QSM was initially developed in Chugach School District and was influenced by TQM and Baldrige concepts.

2.4.1 The Quality Perspective

Both TQM and the Baldrige criteria focus on the implementation and measurement of quality. Experts have offered up various definitions of quality. Their definitions can broadly be summarized as either quality measured by an objective, fixed set of expectations that are quantifiable or quality measured qualitatively based on customer satisfaction. Sallis (1996) wrote that the quality of something is part of its nature. The word *quality* comes from the Latin root *qualis*, which means "what kind of." Quality is a relative term when it is applied to TQM, where quality is measured against some standard. Quality is also dynamic, with both emotional and moral layers, which means individuals and experts may define it somewhat differently.

Sallis (1996) provided definitions for two concepts of quality—procedural and transformational. Procedural quality involves proving things have happened in accordance with predetermined specifications. Student standards-based achievement test scores measured against performance indicators are an example. The key words for procedural quality are *proving*, *approving*, *reporting*, and *accountability*. Transformational quality is based on the need to refocus the organization on the customer versus products or outcomes. It embraces the concepts of customer care, customer service, and social responsibility. Transformational quality is achieved by determining customer requirements and then building organizational structures and a culture that empowers employees to meet the customer requirements.

Transformational quality is a core desired outcome of implementation of the Quality Schools Model of education reform. Peters' (1987) findings related to quality based on years of research (paraphrased for education) were as follows: First, stakeholders will pay a lot for better quality and even more for the best quality; second, school systems that provide the best quality will thrive; third, workers in all parts of the system will become energized by the opportunity to provide top quality; and fourth, no school system has a safe quality lead, as the quality possibilities are dynamic (and increasing) for stakeholders.

Peter Drucker maintained that there were three consistent themes related to quality: managing for results, the dual purpose of doing things right while doing the right thing, and the importance of the customer (as cited in Watson, 2002). Drucker maintained that many nonprofits (including educational systems) don't measure their quality performance because of the belief that good intentions are enough. Drucker suggested there are several ways quality can be presented quantitatively. First is the cost of poor quality. In education, this could equate to low student achievement. Second is the converse, or high quality resulting in high student achievement. Third is customer loyalty, or to use Baldrige in Education parlance, stakeholder satisfaction.

Definitions of quality put forth by some of the quality experts include the following (Hoyer & Hoyer, 2001):

1. **Philip Crosby**: The word *quality* is relative and therefore needs to be measured as conformance to requirements. It is essential to first define

quality and then translate the requirements into measurable characteristics. Then quality can be managed by taking measurements continually to determine conformance to requirements.

2. **W. Edwards Deming**: Quality must be defined in terms of customer satisfaction. The degree of quality is directly related to the extent it satisfies customer needs and expectations. Quality is multidimensional and cannot be measured by a single characteristic.
3. **Armand Feigenbaum**: Quality must be defined in terms of customer satisfaction. The customer's definition of quality is dynamic, so the role of management is to recognize the evolution of the customer's definition of quality.
4. **Kaoru Ishikawa**: Quality is equal to customer satisfaction, and because consumers' needs and requirements change, so does the definition of quality. Before one can say a product or service is high quality, every aspect of the organization that produced it must be of high quality.
5. **Joseph Juran**: A practical definition of quality is not possible. The best way to define quality is fitness for use, where use is associated with customer requirements and fitness means conformance to measurable product characteristics. Juran's Pareto Principle states that as many as 80% of process problems result from 20% of causes.

Sallis (1996) said that quality concepts are hierarchical, starting with quality control. Quality control is the detection and elimination of components or products that don't meet standards. It involves inspection and testing, as well as waste, scrap, and reworking. Realistic examples of this in education are financial and instructional auditing and both formative and summative testing that result in reworking. Quality assurance is what happens before and during events with a purpose of preventing faulty results in the first place. Crosby called this aim "zero defects." Quality assurance is about getting things right the first time, every time. In quality assurance, processes combined with standards ensure the results. In an education setting, task analysis during instructional design and diagnostic testing before instruction would be considered quality assurance practices. TQM and continuous improvement represent the highest level of implementation of quality concepts in Sallis' hierarchy.

2.4.2 Total Quality Management

Applying quality principles specifically to schools and school systems, Deming advised that the goal and focus of educational leaders should be on transforming school systems rather than on achieving numerical goals. He said it was critical that school leaders have a vision, but equally important, they must understand their system in order to operationalize their vision. Deming said that schools must expect and design for variation among students (Teigland, 1993). Deming believed that continuous improvement of key work processes was the foundation for improving quality, and also that workers inherently wanted to do their best work. All focus should be on improving processes to get better results and correct errors, with

managers working alongside employees to gather information and implement process improvements. No one individual is to blame for errors or performance shortcomings, in Deming's view—it is the processes that caused the error and need fixing.

During World War II, Deming's ideas were used to increase American industrial efficiency. Although well received by engineers and scientists, TQM did not meet with a receptive audience of business leaders and managers. After the war, Deming was invited to address top business leaders in Japan who were focused on rebuilding the country's economy. In short, his TQM concepts were well received, and by 1980, Japan dominated world markets through successful exportation of consumer products. At that point, U.S. manufacturing businesses finally accepted that the 19th-century assembly line factory model and bureaucratic organizational structure were outdated and began to embrace TQM principles.

Deming's quality model, TQM, and Baldrige in Education share five common core elements: vision, a focus on continuous process improvement through data collection and analysis, a long-term perspective, a view of the entire school district as a system, and emphasis on overall improvement of core processes (teaching, learning, administration, operations, and personnel) rather than individual improvement (Walpole & Noeth, 2002). Many educators have criticized the application of quality principles to education as inappropriate. The work of Deming and Juran focused on satisfying customers, and within education, a case can be made that the student is the customer. However, others liken students to workers, call student knowledge the

product, and identify teaching and learning as the core operating process (Walpole & Noeth, 2002). Because implementing a focus on quality requires some type of data and data-driven decisions, some critics fear this will result in a narrow focus within education on visible and easily measurable outcomes such as achievement test scores, attendance, dropout rates, and so on. Critics believe the focus on performance measures will inhibit creativity and that other intangible and less measurable outcomes of education, such as a love of learning and development of a sense of curiosity, will suffer (Holt, 1993). Despite the criticism for applying quality principles to education, Deming's 14 points have strong correlation with effective schools research, summarized in Table 2.6 adapted from Teigland (1993).

Table 2.6 Deming's Quality Points Correlated to Effective Schools Research

Deming's quality points	Effective schools research
1. Constancy of purpose toward long-range improvement.	Long-range goal-focused activity. Clear goals and high expectations commonly shared.
2. Reject commonly accepted levels of delays and mistakes.	High and positive achievement expectations. Strategies to avoid nonpromotion of students. School wide emphasis on basic and higher order skills. Effective use of instructional time.
3. Improve input and seek statistical evidence of quality.	Frequent monitoring of student progress using a variety of measures.
4. Seek long-term overall (rather than piecemeal) efficiency.	System wide development and improvement.
5. Look for problems in the system.	Continuous diagnosis, evaluation, and feedback.
6. Institute on-the-job training.	Job-embedded professional development, coaching, and mentoring.
7. Use modern methods of supervision, including shared learning (managers learning from employees).	Positive school and district climate. Shared consensus on values and goals. Parental involvement and support.
8. Drive out fear.	Stability and continuity of key staff. Development of a sense of community.
9. Break down barriers between departments.	Total staff involvement in school improvement. Collaborative planning and collegial relationships.
10. Eliminate slogans, provide effective methods.	Appropriate level of difficulty for learning tasks. Visible rewards for academic excellence and growth. Well-structured classroom activities. Instruction guided by content. Orderly and disciplined school and classroom environments. Teacher empathy and rapport with students. Curriculum articulation and organization. Emphasis on differentiated instruction and development of problem-solving skills.
11. Eliminate work standards.	Autonomy and flexibility to implement adaptive practices.
12. Enable pride of workmanship.	Teacher-directed classroom management and decision-making. District support for school improvement. Recognition and celebration of academic success.
13. Institute vigorous program of education and retraining.	Differentiated instruction. Professional development for teachers.
14. Create management structure for constant improvement of knowledge and effectiveness.	Positive accountability and acceptance of responsibility for learning outcomes. Autonomous school-site management.

TQM incorporates quality assurance and goes beyond that as organizations create a shared vision of a quality culture and rethink the design and structure of the organization to empower employees to surpass customer expectations (Sallis, 1996). TQM is all about providing what the customer wants, when and how the customer wants it, making the customer sovereign. During the second wave of education reform and given the success of the quality movement in manufacturing and industry, political, business, and education leaders began to investigate the applicability of quality principles to education. The focus was on core operating processes, including teaching, learning, administration, operations, and personnel. Using the Baldrige Education Criteria is one method for implementing TQM, though there are other models for applying quality improvements and TQM within schools (Glasser, 1998).

2.4.3 Baldrige in Education

The Baldrige in Education Criteria feature strong emphasis on leadership, systems thinking, changes in school culture, and data-driven knowledge management. According to Sarason (1990), these are the elements lacking in some of the previous education reform initiatives. Some previous reforms also failed when leadership changed and a current change initiative was abandoned and replaced with a new one, or when a reform initiative did not have the core process of teaching and learning as the primary focus (Detert, Kopel, Mauriel, & Jenni, 2000).

The Malcolm Baldrige National Quality Award was established in 1987, named for the late Secretary of Commerce under President Reagan, and originally awarded for three business categories—manufacturing, small business, and service.

The Malcolm Baldrige Education Criteria for Performance Excellence were piloted in 1995, and education was officially adopted in 1998 as the fourth category for the Baldrige Quality Award. (Health care criteria were adopted at the same time, and that is now the fifth Baldrige category.) The purposes of the Education awards are to improve school organizational performance practices, capabilities, and results; to facilitate the communication and sharing of best practices within and outside education; and to serve as a working tool for understanding and managing performance as well as guiding strategic planning and learning opportunities (NIST, 2006).

The Baldrige Education Criteria for Performance Excellence embody 11 core values (NIST, 2006, p. 1-5): visionary leadership; learning-centered education; organizational and personal learning; valuing faculty, staff, and partners; agility; focus on the future; management for innovation; management by fact; social responsibility; focus on results and creating value; and a systems perspective. The seven categories of the Education criteria are Leadership; Strategic Planning; Student, Stakeholder, and Market Focus; Measurement, Analysis, and Knowledge Management; Faculty and Staff Focus; Process Management; and Results. The seven categories focus on organizational performance measured by student learning outcomes; student- and stakeholder-focused outcomes, including satisfaction; financial, budget and market outcomes; faculty and staff outcomes; internal operational performance measures of organizational effectiveness; and leadership and social responsibility outcomes. The number of areas measured is broad so that the needs and satisfaction of all important

stakeholders are represented, as well as both long- and short-term goals. The Baldrige criteria do not specify a particular organizational structure or type of management. The criteria are designed to focus on results rather than procedures to allow for flexibility, innovation, and responsiveness to local conditions and needs. The seven Baldrige categories encompass Deming's 14 quality points.

The Baldrige Education Criteria are primarily focused on teaching and learning, as this is the core process in education. The Education Criteria hold that students are the key customers of educational organizations, and other groups such as parents, employers, and communities are stakeholders. Within the Education Criteria, excellence is defined as having three qualities: a well-designed and executed assessment strategy; year-to-year improvement in the key measures and indicators of performance, especially student learning; and demonstrated leadership in performance and performance improvement relative to comparable organizations and appropriate benchmarks (NIST, 2006, p. 7). The diagram in Figure 2.1 shows the systems perspective of the seven Baldrige Education Criteria and key linkages among the categories. Knowledge Management is shown as foundational to all of the other criteria, and knowledge management activity is specifically addressed by Baldrige in each of the other six categories.

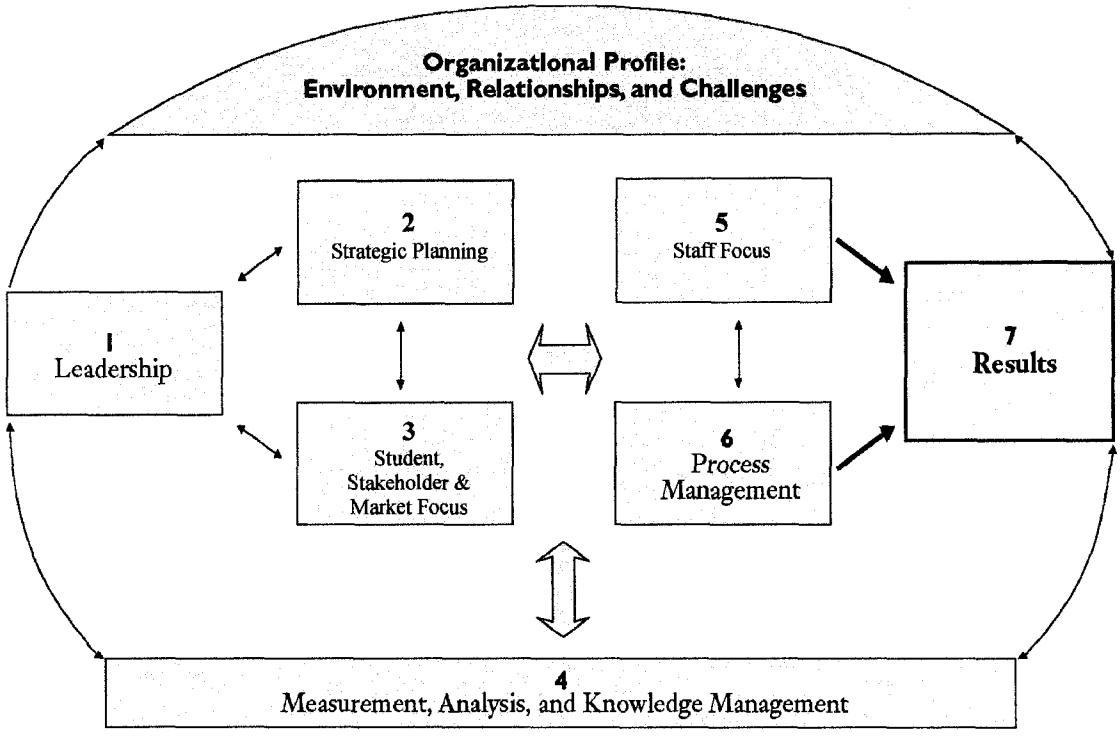

Figure 2.1: 2006 Baldrige Education Criteria for Performance Excellence Framework: A Systems Perspective

The relationships shown in Figure 2.1 are from the 2006 Baldrige in Education model. The structure of the theoretical model and the recursive or nonrecursive nature of the relationships have changed over time. Wilson and Collier (2000) claimed that when the Baldrige quality experts created their visual of the relationships in the model, they didn't know how the specific performance relationships and directions of causation should be defined; "Therefore they defaulted to the premise that everything is related to everything else, and they used two-headed arrows among all Baldrige categories to define the relationships" (p. 363). Collier, Goldstein, and Wilson (2002) contrasted the 1988, 1992, and 1997 Baldrige theoretical models. Both the 1988 and

1997 models showed Leadership and Knowledge Management as drivers of the model. They claimed that the clarity of the causal paths had diminished from the first to the third model, and that the effect of Leadership on Results was not established in the 1988 model, was present in the 1992 model, and was unclear in the 1997 model. Collier et al. (p. 103) concluded, "Alternative causal models just as good or better than the existing Baldrige [theoretical] causal model might exist."

2.4.4 The Relationship among the Baldrige Categories in Practice

Research Question 4 called for testing the Baldrige in Education theoretical model relationships in the context of rural Alaska and the QSM. This section contains a review of the findings of other researchers testing the same question in their unique contexts. A number of researchers (Badri et al., 2006; Bou-Llusar et al., 2005; Evans & Jack, 2003; Pannirselvan & Ferguson, 2001; Samson & Terziovski, 1999; Wilson & Collier, 2000; Winn, 1996) have empirically tested the relationships and design of the Baldrige theoretical model and found different relationships among the Baldrige categories than those depicted in Figure 2.1. Wilson and Collier hypothesized that all of the seven Baldrige categories are related in a recursive causal model and that the sign of each path coefficient is positive, meaning that as the score in one category increases, so should the scores in all of the other categories. Wilson and Collier wrote their own survey and had it reviewed by members of the American Society for Quality. They used 101 variables grouped into seven factors and 160 cases to create a structural model. Wilson and Collier found, similarly to others, that Leadership was the most important driver for the system factors and that Leadership had no direct

effect on Results but influenced overall performance results through the system. They also concluded that Knowledge Management was the second most important Baldrige category and that Process Management was twice as important for predicting Student, Stakeholder, and Market Focus as it was for predicting Results. Their modified causal model highlighted the importance of Leadership on Process Management and Knowledge Management, with those two factors having the greatest predictive effect on Student, Stakeholder, and Market Focus and Results. Wilson and Collier concluded that these five factors were more important than Staff Focus and Strategic Planning in their model.

Badri et al. (2006), in their test of the causal relationships in the Baldrige in Education Criteria, treated Leadership as the independent variable and the other six Baldrige criteria as dependent variables. Badri et al. developed an original questionnaire to measure the 33 Baldrige categories and subscales. The survey was administered to faculty in 15 university facilities in the United Arab Emirates. Badri et al. worked with 224 cases and conducted multiple regression analysis first to test the relationship among the dimensions individually. Then they used structural equation modeling (SEM) to examine the predicted relationships among all dimensions together. Badri et al. concluded that Leadership had a direct causal effect on each of the other six components. They also found an important causal relationship from Leadership to Knowledge Management and found that the paths from Leadership to Results and from Leadership to Student, Stakeholder, and Market Focus were significant and direct, in addition to being indirect through system factors. They found

that Knowledge Management had a significant causal influence on the other system factors and that Staff Focus, Process Management, Results, and Strategic Planning all had a positive causal influence on Student, Stakeholder, and Market Focus, as well as that Strategic Planning had a positive causal influence on Results.

Winn (1996) used a survey of work environment satisfaction with 194 items to measure perceptions about behaviors, events, and experiences rather than feelings and attitudes. He asked 4,800 respondents at a large Midwestern university to focus on their proximate work environment, rather than the university as a whole. Winn had six hypotheses to test directional relationships between the driver (Leadership) and the goal (Customer Satisfaction) and outcomes (Results) and the relationship between system factors (Strategic Planning, Staff Focus, Process Management, and Knowledge Management) and the goal and outcome. Winn proposed a different view of the relationships among Baldrige categories, as shown in Figure 2.2, based on LISREL modeling.

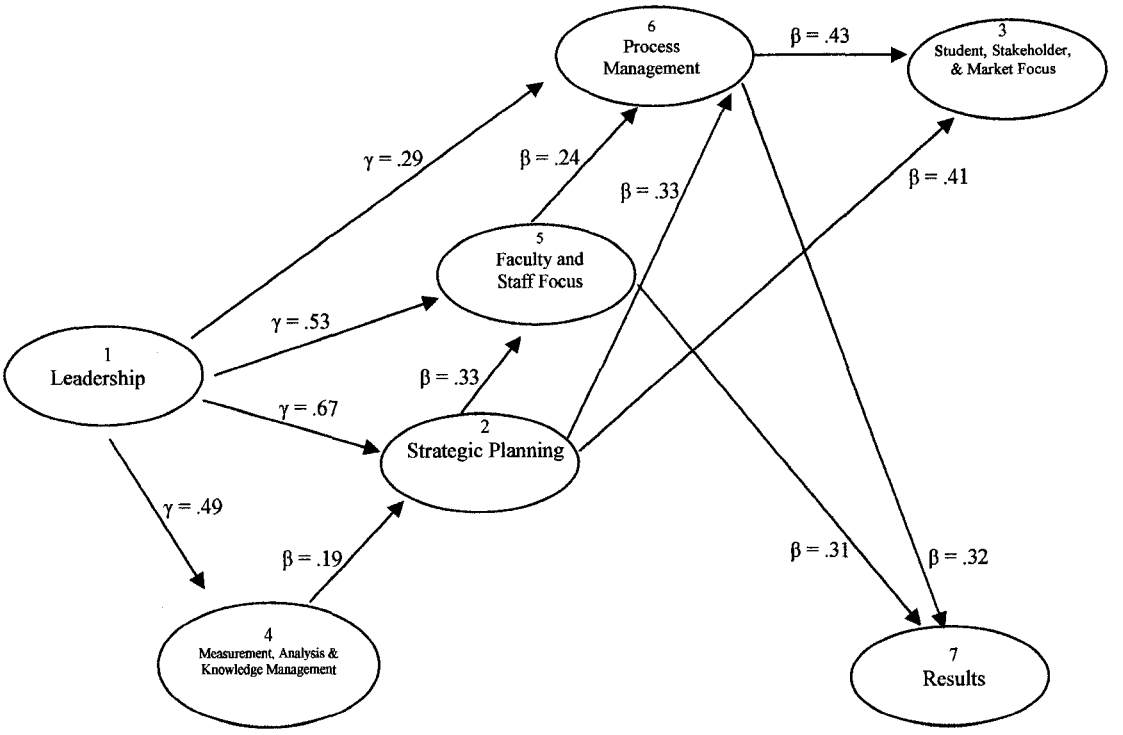

Figure 2.2 Relationship among Baldrige Categories from Winn (1996, p.110)

Winn (1996) concluded that the main impact of Leadership was on the systems dimensions of Process Management, Faculty and Staff, Strategic Planning, and Knowledge Management, rather than on the more outcome-related dimensions of Student and Stakeholder Focus and Results. He concluded that the major influence of leaders was on designing effective systems and processes for achieving results, rather than a direct relationship between Leadership and Results. Process Management was the one dimension with a significant and strong direct effect on both Student and Stakeholder Focus and Results. This supports the importance of process improvement in achieving quality, as well as Deming's argument that the majority of quality problems are due to the structure of processes, rather than related to employee motivation or ability. Further, his results showed Process Management as the one

dimension with a significant and meaningful relationship with the two outcomes (Student and Stakeholder Focus and Results) and Leadership.

Winn (1996) found a significant relationship between Process Management, Faculty and Staff Focus, Strategic Planning, and Knowledge Management, but there was an order to the relationships, as shown by the direction of the arrows in the diagram. Student and Stakeholder Focus was significantly affected by Strategic Planning and Process Management and to a lesser degree by Knowledge Management. There was a weaker but still significant relationship between Knowledge Management and both of the outcome dimensions. Knowledge Management was most significantly correlated to Leadership and Strategic Planning.

In another study within business, Samson and Terziovski (1999) examined the relationship between the award categories for business and performance outcomes. In their study, the categories of leadership, people management (called Faculty and Staff Focus in the education criteria), and customer focus (the Student, Stakeholder, and Market Focus in the education criteria) were the strongest predictors of performance.

Evans and Jack (2003) studied 20 possible correlations and linkages among the Baldrige categories. They concluded that employee satisfaction is correlated significantly with process performance and product quality—in other words, increased employee satisfaction leads to higher performance. They also found process performance correlated significantly with market quality. Customer satisfaction correlated with and was dependent on product quality, service quality, and work

system improvement. Work system improvement was, not surprisingly, also correlated significantly with financial performance.

Walpole and Noeth (2002) conducted a meta-analysis of the literature and empirical research of schools and school districts using the Baldrige in Education Criteria as part of their reform or improvement strategy. They concluded that successful implementation of Baldrige in Education is not easy to achieve and that implementing Baldrige successfully involves a long-term perspective and a focus on changing core processes, especially teaching and learning. Walpole and Noeth said that to have the greatest impact on teaching and learning, elements of the Baldrige criteria should be included in teacher performance expectations. Hackman and Wageman (1995) found that in schools where process quality improvements *were* affecting teaching and learning, the improvements were led by the building principal, and process quality improvement was included in teacher evaluations.

Walpole and Noeth (2002) noted that information about the *effects* of Baldrige implementation was very limited and that, at that time, there was little empirical data that gave details about how, why, or in which contexts an implementation of Baldrige in Education can succeed. They noted that detailed information and comprehensive data were essential for successful implementation of a Baldrige-based reform initiative and that failing to use data in decision making and not changing the core teaching and learning processes were major reasons that many reform efforts failed.

Detert et al. (2000) studied 10 high schools over a 4-year period to follow their implementation of total quality principles. They found that teachers most often

separated process quality improvement from teaching. When teachers did focus on improvement in the classroom, it was related to discipline and classroom management processes rather than teaching and learning. Detert et al. determined that substantial data on core processes were collected in the respective districts in their study but were not available to classroom teachers for decision making. They also found that professional development to accompany the desired process changes was missing. Most districts did not have resources to provide training except in a voluntary manner and/or scheduled outside the school day, which reduced participation.

Corace (2000) used a self-reported 62-item questionnaire that was correlated to student outcomes to look at implementation of Baldrige-based school reform broken down by teaching level, years of teaching experience, and years of experience within a reform initiative that had been in place for 8 years. She found higher levels of importance and application of Baldrige criteria reported by teachers with more than 2 years of involvement in their district's school reform initiative and higher reported levels of importance attached to implementing the criteria and actual application by elementary teachers versus secondary teachers. Her results also included positive correlations between years of involvement in quality school reform and the student outcome of attendance, and between years of teaching and all student outcomes at the secondary level.

2.4.5 The Baldrige Criteria for Measurement, Analysis, and Knowledge Management

Campbell and Fullan (2006) found that a common feature of successful systemic initiatives to increase student achievement was a focus on the use of data

both for system wide planning and for guiding school and classroom practices. They concluded,

> Assessment literacy is a high yield strategy in which increments of capacity in schools and in the district produce significant improvements in student learning. This is because assessment literacy can be directly related to informing instructional strategies and classroom practices that specifically influence student learning. (p. 17)

Knowledge management within the Baldrige Education Criteria for Performance Excellence is called *Measurement, Analysis, and Knowledge Management* (Category 4) and includes examination, organizational selection, gathering, analysis, management and improvement of data, information, and knowledge assets as well as examination of the organizational review of performance. Within the criteria, "Performance measurement is used in fact-based decision making for setting and aligning organizational directions and resource use at the classroom, departmental, key process, school … and whole organization level" (NIST, 2006, p. 23). The Baldrige 2006 Education Criteria for Performance Excellence contain the following descriptions and questions related to Measurement, Analysis, and Knowledge Management, showing connectivity between Knowledge Management and all of the other Baldrige categories (NIST, pp. 23–24):

> *4.1 Measurement, Analysis, and Review of Organizational Performance: How do you measure, analyze and review organizational performance?* This category includes both performance measurement and performance analysis.

The focus is primarily on collection, measurement, and use of explicit knowledge. It includes use of explicit knowledge and information from within the organization and through comparative data collected from outside the organization. Second, it provides criteria for analysis of information about performance and translation of that information into actionable knowledge.

4.2 Information and Knowledge Management: How do you manage organizational information and knowledge? This criterion includes the evaluation of the availability and quality of organizational knowledge as well as knowledge creation and transfer within the organization and to key external stakeholders. It seeks to measure the translation of tacit knowledge into explicit knowledge that can then be transferred and codified.

The Measurement, Analysis, and Knowledge Management category of Baldrige in Education addresses explicit knowledge that has been codified and can be expressed in words and language, mathematical expressions, specifications, manuals, regulations, and so on. Knowledge that can be codified or formalized in some way diffuses more quickly and extensively than knowledge that cannot. The Baldrige in Education theoretical model shows a recursive relationship between the Measurement, Analysis, and Knowledge Management category and the Results category that should provide organizational knowledge for continuous improvement. Argyris and Schön (1978) and Senge et al. (2000) provided an explanation of single-loop and double-loop learning for building organizational knowledge. Single-loop learning is nonrecursive and includes observation of a previous action, reflecting on it, and using that

observation to decide how to change the next action (Deming called this step "planning"). Single-loop learning is effective in simple systems; however, Senge et al. maintained that double-loop learning, which is recursive, is more appropriate for complex systems where it is necessary not only to find out how well an organization does what it does, but also to probe for appropriateness of what the organization decides to do in the first place. Double-loop learning connects with and extends single-loop learning at the point of reflection. Double-loop reflection provides the opportunity to question the appropriateness of operating norms by reconsidering the basic assumptions and conclusions and reasoning that led to them (i.e., "Is our approach to this project appropriate?"). It also provides the opportunity to look outside the organization for examples of approaches tried by others. Baldrige refers to this process as "benchmarking," and it is found in criteria in the Measurement, Analysis, and Knowledge Management; Leadership; and Process Management categories. Last, double-loop learning allows organizations and individuals to reframe new guiding ideas and develop new mental models for use in the future.

Benchmarking, the practice of examining organizational behavior in comparison to others—either like organizations or those perceived to be leading the industry—is an effective way for organizations to acquire knowledge without creating it themselves. About benchmarking, Thompson (2003) wrote, "Under norms of rationality, organizations facing a dynamic task environment seek to score favorably in relation to comparable organizations" (p. 89). Further, he said,

> Lacking absolute criteria of fitness, and being unable to assume that improvement of its past capability is a reflection of this future, the complex organization then turns to social references to demonstrate that it is doing as well as or better than others in its league. When the organization cannot hope to show improvement on all relevant dimensions, it seeks to hold constant on some and show improvement on those of interest to task-environment elements on which the organization is most dependent. Under norms of rationality, complex organizations are most alert to and emphasize scoring well on those criteria which are most visible to important task-environment elements. When cause/effect knowledge is believed incomplete, organizations seek extrinsic measures of fitness for future action. (p. 90)

Peter Drucker (as cited in Watson, 2002), in discussing the need for benchmark and comparison information, said this type of information is critical for strategic planning:

> Benchmarking assumes correctly that what an organization does any organization can do as well. And, it assumes … that being at least as good as the leader is a prerequisite to being competitive. Benchmarking assists leaders by forcing them to look outside themselves and consider opportunities for learning from external sources—opportunities that may allow them to innovate within their industries. (p. 60)

Knowledge Management-related statements can be found within all six of the other Baldrige in Education categories. Within the other six Baldrige in Education

categories, many of the criteria measured rely on quantifying and qualifying tacit knowledge and converting tacit knowledge into explicit knowledge for use by individuals and the organization. The number and significance of knowledge-related statements found throughout the Baldrige criteria support the idea that knowledge management is a critical part of the foundation for education reform success as measured by the Baldrige in Education Criteria. Further, examining knowledge management throughout the model may provide a more holistic view of knowledge functions and activity that is inclusive of tacit as well as explicit knowledge. Statements found in the other six 2006 Baldrige Education Criteria for Performance Excellence that point to management of both implicit and explicit knowledge are shown in Table 2.7.

Table 2.7 Knowledge and Knowledge Management References within the Other Baldrige in Education Categories

Baldrige category/item	Reference
1.1 Leadership	Setting and communicating the organization's vision and values Establishing an environment for organizational learning Mentoring of future leaders
2. Strategic Planning	Organizational and personal learning must be embedded in work processes Effective communication between sr. leaders/the organization, key processes, and the work unit
2.1	Collection of knowledge and information necessary to project future needs
2.2	Collection of knowledge and information to assess progress related to the strategic plan Communication of priorities and purpose
3.1 Student, Stakeholder, and Market Focus	Gaining knowledge about current and future students, stakeholders, and markets Use of a variety of listening and other knowledge-transfer strategies to learn expectations and requirements, such as focus groups and interviews
3.2	Building relationships Obtaining actionable information from students and stakeholders Maintaining effective relationships
5.1 Faculty and Staff Focus	Redesign of the organization to increase decision-making opportunities for all staff Information systems that facilitate communication flow among staff Effective communication across work units and job functions
5.2	Includes opportunities for knowledge and skills sharing Opportunities to train for new jobs, cross training, and team work New employee training and enculturation Opportunities for education and training outside the organization, including sabbatical leave, internships, etc. Knowledge management system that captures organizational knowledge and systematic means for capturing knowledge capital from individual employees
5.3	Staff well being and satisfaction are dependent on effective communication
6.1 Process Management	Timely information to students about their learning progress Timely information to teachers to improve teaching Use of technology to provide 24/7 access to information to stakeholders Communication with stakeholders to identify key points in the instructional process for measuring achievement Selection and use of key knowledge to improve processes, including satisfaction information, benchmarking, research and internal communication of best practices
6.2	Sharing of information among organizational units through analysis and research, benchmarking, and use of information from customers
7.0 Results	Collection and use of results-related knowledge about all facets of the organization

Speaking of the types of knowledge gathered and used for quality management, Joseph Juran argued that statistics could be overdone and that the human satisfaction dimension was equally important (Juran & Godfrey, 1999). Sallis (1996) noted the difficulty in measuring successful output and productivity in services. He said that intangibles or "soft" measures such as care, courtesy, helpfulness, and friendliness are just as important to quality as are numerical measures of performance. "Customers judge quality by comparing their perceptions of what they receive with their expectations of it" (Sallis, p. 23). Kaplan and Norton (1996) devised what has become known as a "balanced scorecard" approach for measuring quality. The approach is called a balanced scorecard because it contains both quantitative and qualitative measures of quality and performance. Kaplan and Norton said that the balanced scorecard approach helps in identifying the right quality measures by aligning them with the organization's vision and strategy. Their scorecard consists of four perspectives:

- Financial perspective: Measures the ultimate results that the business provides to its shareholders—in education, this perspective would include not only the district and school budgets, but importantly, student achievement results.
- Internal perspective: Measures the performance of key internal processes and includes quality levels, productivity, cycle time, etc.
- Customer perspective: Customer satisfaction, service levels (in business, this dimension also includes repeat business and market share).

- Innovation and learning perspective: Looks forward to assets necessary for future success, such as people and their skills development, employee satisfaction, and organizational innovation.

According to Kaplan and Norton (1996), a good balanced scorecard contains both leading and lagging indicators. Lagging measures tell the story of what has happened, while leading indicators, or performance drivers, predict what will happen and allow for midcourse corrections. The leading and lagging indicators should be used to establish correlational or cause-and-effect relationships across perspectives. Kaplan and Norton said that establishing and validating causal relationships is the basis for managing and validating the organization's strategy (or shared vision).

Senge et al. (2000) cautioned that ability to achieve results can be hampered because individuals have difficulty distinguishing their beliefs from truth or fact, when individuals are convinced their beliefs are based on real data, and when individuals become convinced the data they select are the only real data. These conditions result in assumptions and inferences that influence decisions and actions. Collins (2001) found in his examination of companies that went from being good to becoming great that "results came about by a series of good decisions, diligently executed and accumulated one on top of another" (p. 69). In his study, Collins found the two key elements of success were that the companies faced the "brutal facts of reality" head on and that good to great companies also developed a simple process for decision-making. Leaders of those companies led with questions, not answers; engaged in dialogue and debate; and built mechanisms so that important information could not be ignored.

Within education, Lezotte (interviewed in Sparks, 1993) noted the importance of disaggregating student outcome data and communicating the results to parents as part of school improvement. He said, "Disaggregation is not a problem-solving activity; it's a problem-finding activity" (p. 20). Bernhardt (2000) stated that there are three reasons that data are not used well in schools and school districts: a lack of emphasis or importance placed on the data, along with a lack of financial support for data-related activities; lack of training in the selection and analysis of data; and fear of employees that data will turn up something they do not want to see. Bernhardt (2000) advocated the use of multiple sources of data such as those described by the Baldrige in Education Criteria. She categorized data into four types: student learning data, demographic data, perception data, and school process data. Bernhardt (2003) stated that the most useful information came from the "intersections" when two or more different types of data were used at once to create knowledge to address problems or needs and summarized,

> When student learning measures are the only focus of a school's data analysis efforts, school personnel end up using their time figuring out how to look better on the student learning measures. This narrow approach has limited results. By contrast, looking at student achievement results in conjunction with the context of the school and the processes that create results gives teachers and administrators important information about what they need to do to improve learning for all students. (p. 29)

2.4.6 Relationship of Baldrige in Education to the Quality Schools Model

While the QSM is a *strategy* and *structure* for systemic education reform, the Baldrige in Education Criteria are *tools* for measuring alignment with quality principles. The Baldrige criteria for measuring performance excellence represent a comprehensive and holistic set of measures that can be used to examine individual school and school system reform efforts from a quality perspective regardless of differences in reform structure from one initiative to another. The four components of the QSM appear to encompass the core values of Baldrige in Education that were discussed in detail earlier in this chapter, as shown in Table 2.8.

Table 2.8 Correlation of Baldrige Core Values with Quality Schools Model Components

Quality schools component	Baldrige core values
Leadership	Visionary leadership Valuing faculty, staff, and partners Management by fact Systems perspective Focus on results and creating value
Shared vision	Valuing faculty, staff, and partners Focus on the future Focus on results and creating value Learning-centered education Social responsibility
Balanced instruction model	Learning-centered education Social responsibility Focus on results and creating value
Continuous improvement	Organizational and personal learning Valuing faculty, staff, and partners Agility Focus on the future Managing for innovation Management by fact Social responsibility Focus on results and creating value Systems perspective

2.4.7 Summary of the Quality Perspective and the Baldrige in Education Award

The Baldrige in Education model is built on a foundation of quality management theory. Over time, a number of researchers have tested the Baldrige theoretical model in different settings and found that the relationships among the criteria were different in practice than those shown in the theoretical model. One of the research questions in this study is whether the theoretical relationships are true in three rural Alaska school districts. The Baldrige category of Measurement, Analysis, and Knowledge Management seems to focus on measurement of explicit knowledge, while many more tacit knowledge activities can be found within the other six criteria. This may be the reason that the Baldrige theoretical model shows a recursive relationship between Knowledge Management and all of the other categories. The next section of Chapter 2 looks specifically at the design of the QSM, which shows the influence of quality principles and systems thinking, and a close tie to the Baldrige in Education quality measurement statements.

2.5 The Quality Schools Model

The three school districts that are the focus of this study have relied heavily on the education reform work of the Chugach School District, which developed the QSM. This section of Chapter 2 provides a history of the development of the reform model, a review of the literature related to the four components of the model, and the results of four empirical studies related to the QSM.

2.5.1 Systemic Reform in Chugach School District

Leaders in school restructuring have emerged across the country over the last 20 years, in districts with large capacity and a reputation for reform (Dade County), in school districts with many smaller administrative units (New York City), and in schools or districts with a track record of low student achievement and little to lose in terms of instructional quality by attempting systemic reform. Chugach School District in Alaska was an example of the last type of school district in the early 1990s when a complete district restructuring occurred and the QSM was conceived. Chugach School District was subsequently awarded one of the first two Malcolm Baldrige Education Excellence Awards given, in recognition of the performance effectiveness of the QSM designed by district leadership, staff, and stakeholders.

The Chugach School District restructuring effort was and is situated within the context of the second and third waves of education reform and the needs of a primarily Alaska Native student population. Restructuring has been heavily influenced by essential school research by Sizer; effective schools research by Lezotte; research and best practice in working with Native communities and learners; the quality principles of Deming; early work using quality principles by David Langford at Mt. Edgecumbe High School in Sitka, Alaska; the SCANS Report; and the Malcolm Baldrige Education Criteria for Performance Excellence. District staff and community members participated in Alaska Onward to Excellence activities at the start of the reform process and created a shared vision for the success of Chugach students. The following description of "ideal" quality, effective schools in Alaska was provided by

Darling-Hammond (2006) in testimony related to the *Moore v. State of Alaska* case. It seems an apt summary of the instructional design element of the QSM in Chugach School District:

> [Quality effective schools are] organized [so that] teachers who have adequate knowledge of the areas in which they teach [also] have the opportunity to develop strong curriculum and teaching strategies and lessons within [their] content area. This usually includes opportunities for teachers to collaborate with each other in planning curriculum and in organizing their instruction so that it is integrated and coherent from grade to grade and across subject areas. When teachers are enabled to stay with students for longer periods of time, the same teacher with students, for example, for a couple of years, and a team of teachers working with the same group of students, there is evidence that they are more effective. In addition, it is important that teachers are given the time necessary to plan with their teaching team around shared groups of students. Finally, schools that are more successful have clear benchmarks and standards they are aiming for and performances they are trying to develop. Teachers have developed a common, coherent approach to curriculum and teaching and use effective strategies ... (p. 15)

2.5.2 Design and Structure of the Quality Schools Model

The QSM provides for systemic educational reform through four interrelated structural components: leadership, shared vision, standards-based instructional design, and continuous improvement. Knowledge and knowledge management activities are

found throughout all four components of the model. By design, the QSM advocates that a district thoroughly review and then, if necessary, make improvements in the four component areas of the model. The adoption of the model, then, is necessarily a systemic endeavor. However, some school districts have attempted to adopt the model without taking the prescribed approach of improving all areas of the organization. Some, for instance, are adopting standards, creating assessments, and improving associated pedagogy but are not making changes to leadership functions and practice, working to create a shared vision, or using continuous improvement processes. However, Sizer (as cited in O'Neil, 1995) said, "Lasting reform requires creating a climate for local educators and community members to craft their own improvement strategies" (p. 4). While research suggests that all systemic education reform must be tailored for the local setting and conditions and that a staged implementation of education reform may be successful, a partial or staged implementation of the QSM has not yet been studied for its effectiveness.

The QSM is consistent with research findings (Darling-Hammond, Davis, LaPointe, & Meyerson, 2005) that successful school leaders influence student achievement through two important pathways—the support and development of effective teachers and the implementation of effective organizational processes. Embedded in the QSM are the same characteristics that Campbell and Fullan (2006) named as important in systemic efforts to increase student achievement. The Campbell and Fullan study included eight school districts in Ontario, Canada, selected as a representative sample of public and Catholic schools, large and small, urban and rural.

All eight districts were successful in raising student achievement over time. Campbell and Fullan looked for features common to all eight districts that supported the increased student achievement. They identified common features in four strategic areas: leading with purpose and focusing direction; designing a coherent strategy, coordinating implementation, and reviewing outcomes; developing precision in knowledge, skills, and daily practices for improving learning; and sharing responsibility through the building of partnerships. Though the terminology is slightly different, all of the features described by Campbell and Fullan are also present in the QSM. Theory and research related to each of the four interrelated structural components of the QSM (leadership, shared vision, standards-based design, and continuous improvement) are discussed in more detail next.

2.5.2.a Leadership

Frances Hesselbein, President and CEO of the Peter F. Drucker Foundation, said that leaders today must recognize and demonstrate that their people are their greatest asset. In many of the instances and circumstances involved in systemic education reform, the best leadership was not a singular effort. Leaders shared or distributed responsibility in order to create ownership. Accordingly, shared leadership is a well-defined feature of the QSM. Leithwood, Seashore-Louis, Anderson, and Wahlstrom (2004) outlined three core leadership practices, all of which are included in the QSM:

- Setting directions for the organization—developing shared goals, monitoring organizational performance, and promoting effective communication;
- Developing people—enabling teachers and other staff to do their jobs effectively, offering intellectual support and stimulation to improve the work, and providing models of practice and support; and
- Redesigning the organization—creating a productive school culture, modifying organizational structures that undermine the work, and building collaborative processes.

James O'Toole of the Aspen Institute (as cited in Senge et al., 2000) advised that it takes more than technical knowledge to be a leader. The best leaders make the best decisions by including the broadest set of perspectives, taking the longest term view, including the most issues, and looking at all of the consequences for all stakeholder groups. Drucker summarized school leadership this way: "successful school leaders … are those who understand learning needs, develop plans to address those needs, establish priorities, implement the plans, monitor how the needs are being met and are accountable for their actions" (as cited in Sundre & Raisch, 2002). Accordingly, the Baldrige in Education theoretical model places leadership as the "driver" of all of the systems components and activities that produce results.

Marzano et al. (2005) conducted a meta-analysis of 69 research studies related to school leadership to determine the extent to which leadership played a role in school effectiveness, using as a measure of school effectiveness student achievement

scores on large-scale tests. Marzano et al. found a correlation of .25 between the leadership behavior of principals and the average academic achievement of students in their building. They used these findings to develop a set of 21 principles related to school leadership. Their list of leadership principles is very similar to one developed earlier by K. Cotton (2003) using a traditional narrative review, though the meta-analysis conducted by Marzano et al. (2005) allowed them to form additional hypotheses and conclusions.

The range of correlations in the Marzano study was from .33 for situational awareness to .18 for relationships. Marzano et al. cautioned that ranking the 21 responsibilities in importance based on correlation would lead to erroneous conclusions, and instead called attention to how tightly clustered together most of the correlations were. Marzano et al. used a factor analysis of the survey designed to measure principals' self-reported responses to questions that measured beliefs and practice related to the 21 principles. While they cautioned against assigning rank order to the 21 principles based on the initial correlations, they used the factor analysis to do that.

In their study, Marzano et al. (2005) found some behaviors to be more important for different levels or degrees of change, which they termed first-order and second-order change. First-order change is the kind that occurs in small steps in the course of the daily operation of a school. It is neither large nor dramatic. Second-order change, by contrast, involves deep change and alteration of the system in fundamental ways, much like Alaska's QSM is designed to do. Second-order change is not

incremental and is dramatic. Marzano et al. concluded from their findings that all 21 of the principal behaviors (principles) they identified are important to first-order change, at least to some degree. However, not all the principles have equal importance, and they could in fact be ranked according to importance, with Monitoring/Evaluation having the greatest importance and Change Agent having the least significance to first-order change.

By contrast, Marzano et al. (2005) identified seven principles that are important to second-order change, three of which also ranked highly for first-order change (Monitoring/Evaluation, Ideals/Beliefs, and Knowledge of Curriculum). These three responsibilities were deemed important to any type of change. Three other responsibilities important for second-order change were ranked low for first-order change (Change Agent, Optimizer, and Flexibility). Marzano et al. also concluded that some principal responsibilities are negatively affected by second-order change (Culture, Communication, Order, and Input). This seems to be an important conclusion—that school leaders may pay a price for implementation of second-order change. Specifically, team spirit and communication may decline or deteriorate, order and routine may be disrupted, and staff input and enthusiasm may suffer. This conclusion may have added significance in rural Alaska, where communication across cultures can be a challenge and where staff turnover in some years and in some districts can reach 40%.

Peter Drucker, in discussing the school leadership necessary for schools today and its challenges, said,

> Leaders in effective schools emphasize core values and devote time and effort into measuring how those core values are being translated into effective learning. Focusing on outcomes and how to achieve them rather than concentrating only on responsibilities and how to discharge them is among the most difficult challenges facing today's educators. (as cited in Sundre & Raisch, 2002, p. 32)

Von Krogh, Ichijo, and Nonaka (2000) used action phrases to describe the leadership activity and processes that enable the conditions for knowledge creation: instill a knowledge vision, manage conversations, mobilize knowledge activists, create the right context, and globalize local knowledge.

2.5.2.b Shared Vision

The QSM is designed to be driven by the vision of a school district's stakeholders. This shared vision of where the district should be headed is used for all goal setting. When leadership is shared as in the QSM, a strong shared vision must also exist along with an effective knowledge network. Reagle (2007), in her case study of a large rural Alaska school district implementing the QSM, found that developing a shared vision was critical to the success of the reform. Without a sustained process for building shared vision, there is no way for schools to articulate their sense of purpose (Senge et al., 2000). One of Peter Drucker's premier ideas was management by objectives, or focusing the organization to achieve a set of results by aligning the work of its people to a shared set of objectives (the shared vision). He said, "To achieve long-term success, an organization must have a purpose that elicits the dedication of

its people" (as cited in Watson, 2002, p. 56). Drucker said that managing by objectives changes the responsibilities of the supervisor to eliciting agreement on and support for objectives and shared vision. Employees are then given the ability to define the means for achieving the shared vision of the organization. Sizer (in O'Neil, 1995) also supported the need for shared vision by saying,

> You're not going to get significant, long-term reform unless you have subtle but powerful support and collaboration among teachers, students, and the families of those students in a particular community. Without that, you can get short-term changes in instruction, but you won't get at the heart of reform. (p. 4)

The processes of building and spreading a shared vision are more heavily dependent on informal knowledge networks than on written communication and communication aided by technology. In describing the formation of shared vision, Senge et al. (2000) said,

> Catalyzing people's aspirations doesn't happen by accident; it requires time, care, and strategy. To support this creative process, people need to know they have real freedom to say what they want about purpose, meaning, and vision with no limits, encumbrances, or reprisals. (p. 72)

Senge et al. (2000) said that the shared vision of a school district brings together all the disparate aspirations of individuals for a common purpose. Reagle (2007) examined whether the development of a shared vision in a rural Alaska school district included the Alaska Native parent and community populations. She concluded

from her case study of the implementation of the QSM in the Bering Strait School District, where 98% of the student population is Alaska Native, that the shared vision process was important for creating focused conversation, developing mutual respect, linking Alaska Native culture to the curriculum, and creating a "bridge" to address past injustices and inequity (p. 182).

As part of the QSM, development of the shared vision is not a single event but is instead a process that must be revisited over time. In her study, Reagle (2007) found that the shared-vision process and conversations helped the district (as a system of schools) to remain aware of the uniqueness between villages spread over a large geographic area. Developing a shared vision over such a large area was challenging and took time. Reagle found the Senge et al. (2000) description of the shared vision process to be accurate and wrote,

> The time to travel and meet with parents, community members, students, and educators in all of the 15 BSSD sites was not a rushed process. Each visit allowed for conversations to take place amongst communities, as well as time for the information to be shared and discussed locally. Patience and time [are not] virtues typically followed by Western culture; however, [they] are highly valued by indigenous cultures. BSSD has many Native and long-term non-Native educators who understood this important detail. (p. 183)

2.5.2.c Standards-Based Design (SBD)

Fullan (2001a) considered Wave 1 education restructuring initiatives that were limited to procedural changes such as block scheduling and a longer school day and

calendar insufficient for changing educators' understanding of the basic nature and purpose of teaching and learning. However, he did consider Wave 2 restructuring of curriculum design and delivery for high student achievement effective for encouraging deep and fundamental cultural change in education. Research by Kannapel and Clements (2005) and A. Levine (2005) found that when schools provided a caring, nurturing environment of high expectations for all students and staff; offered shared leadership roles among all the stakeholders; utilized a curriculum and instructional program that focused on best practices and research; and had a system in place for continuous improvement, students were successful.

The QSM incorporates research about traditional Native ways of knowing within instructional design, delivery, and assessment. Specifically, instruction is individualized and differentiated, and instructional pacing is based on mastery of concepts rather than time constrained. At the heart of instructional design within the QSM are 10 content areas, including the usual academic subjects as well as innovative areas such as technology, service learning, and personal development that have their basis in the SCANS Report (SCANS, 1991). Student competency in each content area is attained by showing proficiency in the content level's standards. Assessment is often through demonstration of skill. Researchers, including D. U. Levine and Lezotte (1990), advocate mastery of academic content and more authentic measurements of curriculum mastery such as portfolios, projects, and actual performances (Lezotte, interviewed in Sparks, 1993). Graduation from schools using the QSM is competency based and a result of clearly defined expectations, defined routes for achievement, and

self-directed responsibility for learning. The features of the standards-based design component of the QSM may provide students with an effective combination of motivators for participating in the coproduction of education.

Marzano (2005) looked in depth at instructional design and delivery found in the standards-based design component of the QSM. He examined report cards, content and performance standards, and rubrics for Chugach, Lower Kuskokwim, and Bering Strait School Districts to draw conclusions about instructional design. Based on the standards and assessments in use, he calculated the number of decision points encountered by teachers at each grade level during an academic year. Because the instructional model was built based on the design in Chugach School District, results in the other two districts were close but not identical to those at Chugach.

Next, Marzano (2005) looked at the model and tools for the delivery of instruction. The delivery model was composed of direct instruction, performance tasks, thematic units, and individualized learning plans. Additionally, there was a school-to-life component that occurred in four distinct phases when students reached the high school level.

Marzano (2005) concluded that the individualized nature of instruction was one of the greatest strengths of the QSM. He acknowledged that standards-based design provides structure and guidance that inexperienced or floundering teachers might find useful. Additionally, he found that there was a common language that teachers and administrators used to talk about the model. However, then Marzano raised concerns about the sheer volume of standards and assessments. He said there

were more student assessment data points within a given level than teachers could be expected to manage, especially given that all must be recorded as well. He recommended either measurement categories (his own construct, in publication) or organization of standards into topics to scale back on the number of required student assessments.

Marzano (2005) concluded his evaluation of the standards-based design component of the QSM by recommending a reconceptualization of that component without sacrificing its most effective elements. He called for simplification by enfolding some elements into larger pieces, stating that this would also eliminate some of the specific terminology that teachers encounter that causes confusion. Szulanski (2003) wrote that jargon and misunderstood terminology were a specific cause of sticky knowledge transfer. Marzano concluded with a caution that when teachers became confused, they would regress to what they were comfortable with—and would abandon the changes inherent in standards-based design.

2.5.2.d Continuous Improvement

The Japanese word *kaizen* is at the heart of continuous improvement. Kaizen roughly means "step-by-step improvement." Continuous improvement, then, is solid and lasting change based on a long series of small and achievable projects (Sallis, 1993). Systems continually send signals to themselves through circular loops of cause-and-effect relationships (Senge et al., 2000). The signals, in turn, drive improvement efforts.

Practicing continuous improvement means being willing to think outside of the current paradigms and problem-solving methods. Those willing to engage in continuous improvement need to be rewarded for their risk-taking and willingness to propose and try new ideas. Individual involvement has to be substantive rather than pro forma. When that happens and individuals believe their ideas count and are respected, the foundation for continuous improvement is in place (Gemberling, Smith, & Villani, 2004).

The continuous improvement component of the QSM by design calls for decision making based on thorough review and evaluation of a wide range of performance-based and customer satisfaction-related sources of knowledge, often accomplished using the Baldrige in Education Criteria as a guide. The concepts of continuous improvement and systems thinking are underpinned by the idea that decision making in organizations should be based on facts and focus, rather than perceptions and politics. Because the process is continuous, success can always be improved upon. Peter Drucker said about the "problem" of success, "Success always makes obsolete the very behavior that achieved it. It always creates new realities. It always creates, above all, its own and different problems. Only the fairy tale ends, they lived happily ever after" (as cited in Sundre & Raisch, 2002, p. 32).

Sallis (1996) noted several barriers to continuous improvement in school systems, including organizational culture and the nature of organizations to seek equilibrium (if it's not broke, don't tinker with it), lack of time, external pressures, and poor or ineffective communication and knowledge management. Sallis said that "the

importance of a clear and positive communication strategy cannot be overstated.... Without clear thinking and thoughtful communication, energy can be misdirected and wasted" (p. 127).

2.5.3 Four Studies Related to the Quality Schools Model

There have been four empirical studies specifically related to the QSM. Jester (2001) conducted a case study of the development and implementation of the QSM in Chugach School District and concluded with some recommendations for implementing the model in other districts. Reagle (2007) used mixed methods to both address criticisms voiced by Jester and to look at the level of community "voice" during implementation of the QSM in the Bering Strait School District. Marzano (2005) conducted a thorough analysis of the standards-based design component of the QSM and then correlated the whole QSM to the CSR criteria. The last study, done by Coladarci et al. (2005), used previously administered survey data to correlate the level of implementation of the QSM with student achievement results. Those four studies are reviewed in detail in this section.

Campbell and Fullan (2006) described the importance of examining available effective education reform initiatives and models this way:

> It is necessary ... to identify cases in which specific [successful] strategies are in place so that we can examine what they look like in practice. Even with this increased precision, it is difficult to detail specifically "how to" make districts successful as there are no universal blueprints for success. The combination of strategies and the influence of local contexts, needs and experiences will vary

> in the implementation and outcomes of similar practices in different contexts. To a certain extent districts must identify and review their own particular solutions drawing on the best knowledge from evidence of successful practices locally and beyond. (p. 19)

The first study of the QSM by Jester sought to "understand [Chugach School District's] standards-based reform in a socio-historical context" (2002, p. 1). Jester conducted interviews, observations, and document analyses in order to examine the QSM and then considered these data within the context of a "civilization-savagism paradigm" (p. 7) that seeks to "erase Indian identity by eliminating external symbols of tribal attachment and replace their tribal identity with the values and behaviors of civilized society" (p. 4). Jester concluded that policies and practices adopted by Chugach School District in the implementation of the QSM reflected the three strategies used historically to implement the civilization-savagism paradigm. Short-term attendance by students at the district's residential Anchorage House was determined by Jester to "remove Alaska Native children from the perceived unhealthy/inferior homes and communities and immerse them in the healthy/superior environment of the dominant society where they could learn to live healthy/superior lives" (p. 28). The inclusion of career, personal, and social development content areas in the Chugach curriculum was considered an intentional focus on nonacademics reflecting the civilization-savagism strategy of preparing Indian/Alaska Native students for "underclass positions in the U.S. society" (p. 28). Finally, Jester concluded that Chugach administrators and teachers developed and perpetuated an

"unhealthy Native construct" (p. 29) for the purpose of indoctrinating Alaska Native students in the ways of the dominant society. Jester based his findings largely on interviews conducted with Chugach administrators and teachers, utilizing their comments as evidence of civilization-savagism strategies. While interviews were conducted with school board members, no interviews were conducted with parents, students, or other community members as part of the study. Jester did not consider those individuals as key stakeholders in the shared vision component of the QSM but rather as the victims of the civilization-savagism strategies he described in the district. Jester's recommendations for future study included considering how stakeholders in QSM districts perceived the shared vision concept and how Alaska Natives perceived and responded to standards-based reform.

Reagle (2007) sought to address the criticisms leveled by Jester related to the QSM and to discover "how the voices of Alaskan Native people in one school district were and are being impacted by the QSM—the voices of students, parents, community members, and educators" (p. 6). Focusing her mixed-methods research on the Bering Strait School District, Reagle used quantitative student performance data publicly available through the Alaska Department of Education and qualitative data gathered through written surveys for educators and interviews with parents, community members, educators, students, and QSM developers. Reagle found that QSM implementation in Bering Strait School District "resulted in positive involvement of students, parents and community members" (p. 174), "new interaction patterns of involvement for Alaska Native parents and community members that has potential for

sustainable results" (p. 175), and "a genuine Shared Vision that was fostered and supported by students, parents, community members, and educators" (p. 183). Challenging Jester's (2005) claim that the QSM marginalized Alaska Natives for the benefit of the district, Reagle found that "responses from students, parents, and community members, when asked how the district was different from three years earlier included comments of understanding, satisfaction, and ownership of the new system" (p. 212). Reagle recommended that future research regarding the QSM in the Bering Strait School District consider whether the new interaction patterns have filtered to individual schools and communities, and how professional development is supported by the district and perceived by staff.

Marzano (2005) studied the overall design of the QSM to determine whether it was consistent with federal CSR program criteria and found that "in general, the QSM addresses the vast majority of the eleven CSR criteria at least to some extent" (p. 46). Table 2.9 provides a summary of his findings.

Table 2.9 Summary of Comprehensive School Reform Criteria Applied to the Quality Schools Model (Marzano, 2005)

CSR criterion	Findings
1	List of instructional practices is presented in SBD. However, no empirical evidence is presented as to their effectiveness.
2	Instruction, assessment, professional development, and school management are addressed explicitly or implicitly in QSM, SBD, or both. Classroom management not directly addressed. Treatment of the elements in the QSM is not uniform.
3	Issue of teacher and staff professional development and training addressed as criteria within the QSM. However, little explicit guidance provided in terms of how high quality is to be achieved.
4	Measurable goals with benchmarks addressed in depth in the discussion of the Design and Application of Standards within the QSM.
5	Support by teachers, principals, administrators, and other stakeholders addressed in continuous improvement component of the QSM.
6	Support for teachers, principals, administrators, and other staff through shared leadership addressed in leadership component of the QSM.
7	Involvement of parents and local community is addressed in stakeholders component of the QSM, but emphasis is on communication among these groups and the planning of the program; emphasis is not on evaluating the program.
8	No explicit discussion of use of external institutions for technical support.
9	Annual review appears implicit in the QSM; however, little explicit guidance provided.
10	No explicit attention to procurement of external sources of support for resources. However, such involvement can be inferred.
11	Data presented regarding improvement of student achievement, but no strong argument or presentation of data is provided.

Marzano (2005) found that 7 of the 11 criteria were adequately met within the QSM. Regarding criterion 2, Marzano found that "the QSM explicitly or implicitly addresses all aspects of this criterion" (p. 43). Goals and benchmarks for students' academic achievement (criterion 4) were found to be "addressed in great detail within the implementation of the QSM" (p. 44). Building support for the QSM reform effort and facilitating shared leadership (criteria 4 and 5) were found to be addressed through the continuous improvement and leadership components of the QSM (p. 45). Marzano found that the involvement of parents and the community (criterion 7) was addressed as well, through the continuous improvement component of the QSM. Involvement of the Bill and Melinda Gates Foundation provided evidence of criterion 10, which requires obtaining resources to support the reform effort.

Marzano (2005) identified four CRS criteria that were not well met within the QSM. Regarding criterion 1, he suggested that the QSM's instructional model be simplified and that research and theory supporting the model be detailed in a "rigorous and comprehensive" report (p. 47). The methods for addressing criterion 3, which focuses on the professional development of staff, could be strengthened in the QSM by providing districts with specific recommendations for effective practice (p. 48). Criterion 9 requiring the annual evaluation of the school reform model and criterion 11 showing strong evidence of improving academic achievement of students could be addressed through "an annual review and synthesis of the documented impact of the model on student achievement" (p. 48). Marzano cited the study by Coladarci et al. (2005), also underway at the same time, as a good place to start relative to criterion 11.

The fourth study directly related to the QSM was conducted by Coladarci et al. (2005) to examine the relationship between QSM implementation and student achievement. The disconnect between school and community, created when traditional Western-style schooling first came to Alaska (C. Barnhardt, 1985; Kushman & R. Barnhardt, 1999), continues to be recognized as one of the main reasons for the poor academic performance of Native students. Obviously, higher student achievement is the desired outcome from the implementation of the QSM of education reform. Yet based on 2003 aggregate statewide data, achievement for Alaska Native students had not risen over time to the degree it had for other groups of students (McDowell Group, 2004). However, in their analysis of the implementation of the QSM relative to student performance, Coladarci et al. concluded that achievement of Native students as measured on state benchmark examinations had improved more in schools and districts using the QSM relative to data for students in comparable schools not using the QSM. Individualized instruction, community involvement, and contextual learning may be the key features of the QSM responsible for the difference between statewide and QSM results.

Coladarci et al. (2005) utilized survey data gathered by the Reinventing Schools Coalition from 642 certificated and classified staff members in 15 school districts. The Re-inventing Schools Implementation Monitoring (RIM) Survey (Cope & Crumley, 2003) contained 32 items that assessed respondents' perceptions with respect to the four QSM components using a 6-point scale ranging from *awareness* to *fully implemented.* Over half of the respondents had been working in a QSM district

for 3 years or more. For each individual, a composite score across all 32 items served as an overall indicator of QSM implementation. The mean composite across individuals was used to obtain a mean implementation score for each district. Coladarci et al. used respondents' demographic information to differentiate between perceptions of those who had been in a QSM district for 1 to 2 years and those who had been in a QSM district for greater than 2 years.

Coladarci et al. (2005) found that respondents having a longer history with the QSM "appeared to be higher in QSM implementation as measured by the RIM survey" (p. 11). Coladarci et al. also analyzed the results of state-mandated standards-based assessments in Grades 3, 6, 8, and 10 for a 4-year period from 2000 to 2004, aggregating the data across grades to obtain a "proficiency percentage for each content area for each year" (p. 12). Seven of the 15 districts had the highest percent proficient in reading achieved in the 2001–2002 school year. A pattern of increasing proficiency in the area of writing was found across all 4 years. No consistent pattern of increasing proficiency across districts was found in the area of mathematics. Using the RIM results and the proficiency scores for 2003–2004, Coladarci et al. then considered whether "districts involved with QSM longer have a higher percentage of proficient students when compared to districts having less experience with QSM" (p. 29). They found that

> in general RIM-related perceptions are positively and significantly correlated with district achievement in 2003–2004: Higher achievement generally is found in districts where employees report higher levels of QSM

> implementation and lower achievement is found where lower levels of QSM implementation are reported. (p. 34)

Coladarci et al. cautioned readers against inferring a causal relationship between RIM scores and proficiency scores, and instead called their findings "encouraging associations" (p. 34).

2.5.4 Summary of the Quality Schools Model

There is a theoretical basis for each of the four components of the QSM. The QSM was shown by Marzano (2005) to be generally well aligned with the criteria of the CSR program, with several areas noted for improvement. Three other studies of the QSM pointed to the importance of community voice (Reagle, 2007), provided some early association between implementation of the model and student achievement (Coladarci et al., 2005), and recommended further study related to community perception of standards-based school reform (Jester, 2002 and 2005). None of the previous studies considered completely the implementation of the QSM. The next section of Chapter 2 looks at the field of knowledge management in more detail. Knowledge creation and knowledge use are the core technology of education and are found throughout the components of the QSM.

2.6 Knowledge Management

The field of knowledge management is truly interdisciplinary—it draws from psychology, sociology, management science, economics, anthropology, political science, education, and technology. The way knowledge is created, used, stored, and transmitted can vary among community and organizational cultures. Nonaka said,

"Knowledge is a multifaceted concept with multilayered meanings" (1994, p. 15). Within the rural Alaska setting of this study, knowledge management, as described by the Baldrige in Education measurement criteria, seems to be a particularly Western construct, where knowledge is segmented, isolated, and measured in contrast to the traditional indigenous view of knowledge as holistic and connected with everything else. Additionally, in rural Alaska, knowledge activities must take place in a setting where individuals are separated by great distances and where annual school district staff turnover is high.

Knowledge creation and use are the core technology of education, with highly educated students the ideal result. Knowledge management in education seems to have evolved with the waves of education reform. When the focus of education reform was on pedagogy and the learning process, teachers parsed knowledge by conducting task analyses to determine what students already knew before designing instruction. During Wave 2 education reform, communities of practice became popular for the purpose of teacher professional development and growing the knowledge resources within the school organization. With the advent of site-based management, educators realized that knowledge resources previously used by just a few individuals needed to be shared alongside shared leadership and decision making. Wave 3 and NCLB ushered in new demands for results, and the phrase *data-driven decision making* became popular. With all of these considerations in mind, a thorough discussion of the knowledge management literature and research from several perspectives is included next as background for this research studying the degree of knowledge management

practices within the implementation of the QSM.

This section of Chapter 2 covers six knowledge-related topics. First is a look at the history of the discipline of knowledge management. Next is a review of the literature related to major knowledge concepts. Third, a distinction is made between data, information, and knowledge. The next topic is knowledge generation and acquisition followed by a discussion of knowledge use. The sixth topic is a review of the theoretical and empirical literature related to knowledge management in education. Following this, the literature related to cross-cultural knowledge activity is presented and discussed.

2.6.1 History of the Knowledge Management Discipline

The recorded study of learning and knowledge dates back at least as far as the writings of Plato (who took a rational approach to knowledge) and Aristotle (who adopted an empirical viewpoint). The study of organizational knowledge has been around for some time, but primarily within the economic community. The individual credited with popularizing the subject is Ikujiro Nonaka, and he has been one of the most prolific writers on the topic. His thinking was influenced substantially by the philosopher Michael Polanyi. Cyert and March (1963) wrote one of the first books that articulated a theory of organizational learning as part of decision making. One of their key ideas was that organizations adapt to their environment through organizational learning processes. They also proposed an early version of the distinction between single- and double-loop learning, defined earlier in Chapter 2 related to the continuous improvement component of the QSM.

Argyris and Schön (1978) distinguished in their work between individual and organizational capacity to engage in significant learning. They pointed out that human behavior in organizations often doesn't follow the tenets of rationality and that both individuals and organizations seek to insulate themselves from unpleasant learning by establishing defensive routines. Peter Drucker coined the terms *knowledge work* and *knowledge worker* around 1960. He was one of the earliest thinkers to see that we would evolve into a knowledge society where the "basic economic resource" would become knowledge. The idea of the learning organization emerged in the late 1980s and became popular within education as a result of Peter Senge's work, which was founded in systems theory and provided the potential for renewal and growth.

2.6.2 Major Knowledge Management Concepts

The quadrant shown in Figure 2.3, developed by Easterby-Smith and Lyles (2005, p. 3), is helpful for viewing and defining the terms *organizational learning*, *learning organization*, *organizational knowledge*, and *knowledge management*.

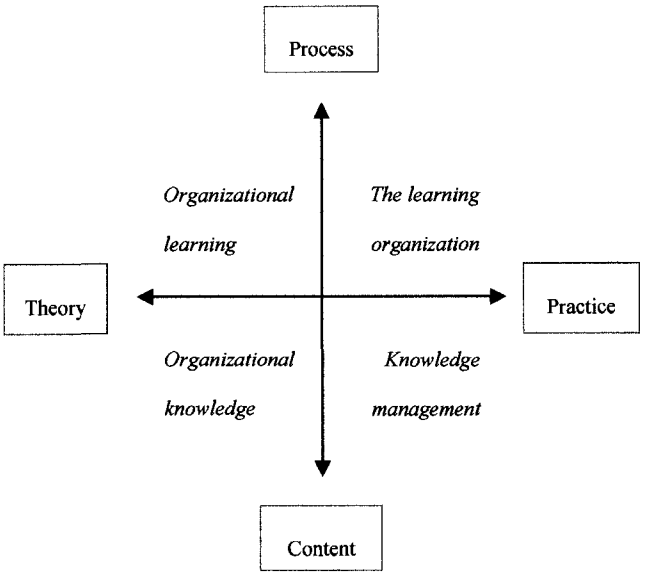

Figure 2.3: Learning and Knowledge Quadrants

Several authors have offered definitions that distinguish between organizational learning, the learning organization, organizational knowledge, and knowledge management and have discussed their interrelationship. Vera and Crossan (2005) said that organizational learning is "the process of change in individual and shared thought and action, which is affected by and embedded in the institutions of the organization" (p. 123). It is when individual and group learning become institutionalized that organizational learning occurs and knowledge becomes explicit, stored in routines, systems, structures, culture, and strategy. Senge (1990, p. 1) defined a learning organization as "a place where people continually expand their capacity of creating results they really want ... and where people are continually learning to learn." Organizational learning is descriptive, while learning organizations are prescriptive. Easterby-Smith and Lyles (2005, p. 2) summarized the distinction this way:

> Organizational learning refers to the study of the learning processes of and within organizations, largely from an academic point of view. The learning organization is an entity, an ideal type of organization, which has the capacity to learn effectively and hence to prosper.

In academic papers, the term *organizational knowledge* gets more frequent use than *knowledge management*. Organizational knowledge is an established theoretical construct. It is representative of descriptive streams of research, where the intent is to understand and conceptualize the nature of knowledge contained within organizations. Efforts to distinguish between tacit and explicit knowledge and what individuals versus organizations know are examples of the study of organizational knowledge. Knowledge management definitions generally contain a prescriptive element (managed learning), and it is assumed to have a positive impact on performance. O'Leary (1998, p. 34) defined knowledge management as "the formal management of knowledge for facilitating creation, access, and reuse of knowledge, typically using advanced technology," and Liebowitz and Wilcox (1997, p. i) defined it as "the ability of organizations to manage, store, value, and distribute knowledge." Knowledge management is often closely linked to the management of information technology. Examples of knowledge management tools and solutions include intranets, data warehousing and knowledge repositories, electronic document systems, best practices/lessons learned databases, and groupware.

Boisot (1995) created a table for classifying knowledge based on the characteristics of codification and diffusion. Codified knowledge has been formalized,

stored, or put into writing, while uncodified knowledge is unwritten and may or may not be verbalized. Diffused knowledge is widely available, while undiffused knowledge resides in individuals. Table 2.10 shows Boisot's typology of knowledge (1995, p. 146).

Table 2.10 Boisot's Typology of Knowledge

	Undiffused	Diffused
Codified	Proprietary knowledge	Public knowledge
Uncodified	Personal knowledge	Commonsense knowledge

The most conventional definition of knowledge is the type Boisot called public knowledge. It is both codified and widely available in the form of textbooks, newspapers, research journals, and so on. Over time, public knowledge may ossify, acquire inertia, and become hard to modify. The other type of widely diffused knowledge is commonsense knowledge. It is acquired over a lifetime, and what is internalized depends on the people with whom an individual interacts and the extent of their influence on the individual. Proprietary knowledge is knowledge developed and codified by individuals or groups to make sense of their particular situation. Locally designed education reform initiatives would fit this description. The last type of knowledge is personal knowledge, which is very individual and hard to articulate. Personal knowledge generally is only shared as individuals participate together in some concrete experience, such as mentoring, tutoring, or expert–apprentice modeling, as found in traditional Native ways of knowing.

Organizational knowledge is often classified as tacit, explicit, or cultural. Explicit knowledge is primarily formal and codified. The most common examples are books and documents, white papers, databases, standard operating procedures, and policy manuals. Because explicit knowledge can be expressed formally using symbols, it is easy to communicate and diffuse. Explicit knowledge tends to be either rule-based (standard operating procedures and policy manuals) or object-based (software code, patents, technical drawings, tools, and photographs).

Tacit knowledge represents some of the unique competencies within an organization but poses problems in that it is hard to transfer and move from one part of an organization to another (Easterby-Smith & Lyles, 2005). One of the most famous and frequently cited quotes about tacit knowledge came from the philosopher Michael Polanyi, who said (1966, p. 4), "*we can know more than we can tell.*" Tacit knowledge is both informal and uncodified. It is found in the heads of individuals (employees), the experience of customers, and the memories of past customers and stakeholders. Tacit knowledge is hard to catalogue and quantify, highly experiential, difficult to document, ephemeral, and transitory. Tacit knowledge is the implicit knowledge used by organizational members to perform their work. Tacit knowledge is hard to verbalize because it is expressed through action-based skills, and it is difficult to reduce to a set of rules or steps. Tacit knowledge is central to Eisner's (1998) concept of connoisseurship as applied to schools, classrooms and teaching. Tacit knowledge is transferred through experience and trial and error where the learner develops an intuitive ability to make judgments about how to complete the activity

successfully. Schön (1983, p. 54) described three basic characteristics of tacit knowledge:

- Tacit knowledge is part of actions, recognitions, and judgments that are carried out spontaneously; individuals do not have to consciously think about them before or during their performance.
- Individuals are unaware of having learned to do those things; they just do them.
- Individuals have difficulty or are unable to express the knowing behind the action.

Tacit knowledge is imbued in technical and professional skills as well as traditional Native cultural skills and resides in an individual's procedural memory (Choo, 1998). A key to success in organizations and cultures is developing the means and processes to tap into the implicit, tacit knowledge of group members or employees. This achieves additional significance in organizations with high turnover, where knowledge constantly walks out the door with employees who leave.

Nonaka and Takeuchi (1995) said that while explicit knowledge is the dominant mode of knowledge in the Western tradition, they believed that tacit knowledge is more important and often overlooked as a critical component of collective human behavior. Tacit knowledge is harder to articulate with formal language because it involves intangible factors such as personal belief, perspective, and the value system. Nonaka and Takeuchi called explicit knowledge and tacit knowledge "basic building blocks in a complementary relationship" (p. ix). Dalkir

(2005) provided a comparison of the properties of tacit and explicit knowledge (p. 8), as shown in Table 2.11.

Table 2.11 Properties of Tacit and Explicit Knowledge

Properties of tacit knowledge	Properties of explicit knowledge
Ability to adapt, to deal with new and exceptional situations	Ability to disseminate, to reproduce, to access, and to reapply throughout the organization
Expertise, know-how, know-why, and care-why	Ability to teach and to train
Ability to collaborate, to share a vision, to transmit a culture	Ability to organize, to systematize; to translate a vision into a mission statement, into operational guidelines
Coaching and mentoring to transfer experiential knowledge on a one-to-one, face-to-face basis	Transfer of knowledge via products, services, and documented processes

Much of the knowledge embedded in the QSM and measurable via Baldrige in Education Criteria exhibits characteristics of explicit knowledge: It has been codified into operational procedures for uniform transfer, includes a written shared vision, and allows for systematic action. The characteristics of tacit knowledge are also valued through collaborative activity to articulate the shared vision and time spent in coaching and mentoring. Notably, flexibility and adaptability, two of the most important human and organizational qualities for achieving change and reform, are associated with tacit knowledge.

The third type of organizational knowledge is cultural. Knowledge of the organizational culture is uncodified and broadly diffused within the relationships that

connect a group or organization. Choo (1998) described organizational cultural knowledge to "include the assumptions and beliefs that are used to describe and explain reality, as well as the conventions and expectations that are used to assign value and significance to new information" (p. 112). During knowledge creation, cultural knowledge provides a pattern of shared assumptions. Leonard-Barton (1998) said that cultural knowledge supplies values and norms that

> determine what kinds of knowledge are sought and nurtured, what kinds of knowledge-building activities are tolerated and encouraged. There are systems of caste and status, rituals of behavior, and passionate beliefs associated with various kinds of technological knowledge that are as rigid and complex as those associated with religion. Therefore, values serve as knowledge-screening and control mechanisms. (p. 19)

Sackman (1992) described four kinds of cultural knowledge in organizations: dictionary knowledge, directory knowledge, recipe knowledge, and axiomatic knowledge. Dictionary knowledge represents commonly held descriptions in the organization and describes the "what" of situations. It also includes acronyms specific to the organization (like QSM, SBD, etc.). Directory knowledge describes commonly held practices and knowledge about sequences of events over time. Recipe knowledge, most simply, is "the way things are done." Axiomatic knowledge refers to reasons and explanations and accounts for "why" things happen.

2.6.3 The Distinction among Data, Information, and Knowledge

Many writers have made careful distinctions among data, information, and knowledge (Choo, 1998; Dalkir, 2005; Davenport & Prusak, 1998; Takeuchi & Shibata, 2006). Davenport and Prusak defined *data* as a set of discrete, objective facts about events. Organizationally, data are likely to appear as structured records. An educational example of data is standardized test results. Data have no inherent meaning. Data are limited in that they can only describe part of what happened—data contain no judgment, interpretation, or indication of relevance or importance. Transactions can only partially be described by data, because data cannot tell, for example, a student's state of mind when taking the standardized test or how much rest the student had the night before testing. Data are usually stored using technology; they are usually evaluated quantitatively in terms of cost, speed, and capacity and qualitatively according to timeliness, relevance, and clarity. The Baldrige in Education Criteria for knowledge management contain both qualitative and quantitative measures of data quality.

Data are the raw material for the creation of information (Davenport & Prusak, 1998). Peter Drucker (in Modic, 2006, p. 11) called information "data endowed with relevance and purpose." Davenport and Prusak described the ways data acquire meaning through contextualization (purpose for which the data were gathered is added); categorization (key components or units of analysis of the data are made known); calculation (statistical or mathematical analysis is added); correction (errors

are removed from the data); and condensation (data are summarized in a more concise form).

While technology can be used for computing values and mathematical calculations with data, Davenport and Prusak (1998) pointed out that humans must be directly involved in the transformation of data into information, and that the medium (technology) is not the message (information; p. 4). Information involves communication with a sender and receiver. Unlike data, information is meant to change the way a receiver perceives something and to have an impact on the receiver's judgment and behavior. Ultimately, it is the receiver who decides whether the message he or she gets is really information. Information moves through organizations via networks that include e-mail, regular mail, notes, articles marked with a message, and so forth. Quantitative measures of information management include connectivity and transactions, while qualitative measures include informativeness and usefulness. Both quantitative and qualitative measures of information quality are found in the Baldrige in Education Criteria. Taylor (as cited in Choo, 1998) presented eight different categories of information use, often combined in use depending on the context. They are enlightenment, used to develop a context; problem understanding, used to develop comprehension of a situation; instrumental, which is procedural like instructions; factual information used to describe reality; confirmational, used to verify another piece of information; projective, such as forecasts and estimates; motivational, used to initiate or sustain buy-in; and personal or political, used to develop relationships, enhance status, or achieve personal goals.

In contrast to either data or information, knowledge is more subjective. Takeuchi and Shibata (2006) pointed out two distinctions between information and knowledge. While both are about meaning, are context-specific, and are relational, knowledge contains an action component and is rooted in individuals' subjective views of the world or mental models. "Knowledge is a function of a particular stance, perspective, or intention," according to Takeuchi and Shibata (p. 4). Knowledge is richer, more valuable, and harder to manage than either data or information. It can be either fluid or formally structured, and in many cases is intuitive rather than expressed in words. Davenport and Prusak (1998) defined knowledge as

> a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms. (p. 5)

Knowledge contains judgments, and organizational knowledge is imbued with the values and beliefs of individuals. Knowledge is dynamic, growing and changing through interaction with the environment; knowledge that ceases to be examined and revised becomes dogma or opinion instead, according to Davenport and Prusak (1998).

Fundamentally, the creation and use of knowledge are at the heart of education. Not only are knowledge creation and use the core technology; they are also

essential to the successful operation of any school or school district—particularly so in a reform environment. Theorists agree that knowledge creation and sharing must be named as core organizational values, with processes established to turn the values into action (Choo, 1998; Dalkir, 2005; Davenport & Prusak, 1998; Dixon, 2000; Fullan, 2001a; Leonard, 1995; Von Krogh et al., 2000). Fullan said that within organizations, knowledge sharing must become a cultural value based on carefully cultivated personal relationships among individuals, citing a causal relationship between collaborative work cultures and knowledge creation and sharing. Theorists differ in opinion on the direction of the causation, however. Dixon and Fullan shared the belief that the causal relationship starts with the sharing of information and knowledge individuals deem important and results in the development of a collaborative culture. Von Krogh et al. (2000) theorized that the causal relationship is the reverse: Knowledge sharing and creation will happen after effective relationships have been established. The next two sections look at the literature related to knowledge creation and knowledge use, in turn.

2.6.4 Knowledge Creation

Davenport and Prusak (1998) named four key knowledge activities: knowledge generation, knowledge coordination, knowledge transfer and knowledge codification. Knowledge generation or creation is precipitated by some situation or critical incident that reveals gaps in the existing knowledge of the organization (Choo, 1998). Knowledge generation, according to Davenport and Prusak (1998), includes knowledge created within an organization as well as knowledge acquired by the

organization. Davenport and Prusak described five ways knowledge as an object may be generated, unlike Nonaka and Takeuchi (1995), who viewed knowledge creation as a process of converting tacit knowledge into explicit knowledge.

The five ways organizational knowledge is acquired, according to Davenport and Prusak, are purchasing, renting, fusion, adaptation, and networking. Davenport and Prusak maintained that originality of knowledge is less important than its usefulness and that one of the most direct and effective ways for organizations to acquire knowledge is to purchase it—in the case of education, a common example is hiring certificated staff with specific, sought-after credentials. Organizational knowledge that is connected to particular people and a particular environment can be fragile, however. When those same individuals leave, they take what they know with them, diminishing the organization's knowledge assets. This phenomenon is an annual occurrence in some rural Alaska school districts where staff and leadership turnover can be quite high.

Organizations also rent knowledge in the form of consultants such as subject experts, professional developers, and grant writers. While some degree of knowledge transfer is likely to occur, Davenport and Prusak (1998) cautioned that if the expert's knowledge has substantial depth, only a small portion of it may be captured and transferred during a short consulting engagement. Another way organizations generate knowledge is through a dedicated unit or group for that purpose—in business, often the research and development group. In education, the equivalent might include the professional development, evaluation, curriculum, finance, and instructional

technology departments of a school district. These in-house dedicated knowledge resources may pose knowledge transfer difficulties, however, as the knowledge creators and users may not even speak the same technical language or share the context of local school practitioners.

The third method for creating knowledge was called *fusion* by Davenport and Prusak (1998), *creative abrasion* by Leonard-Barton (1998), and *creative chaos* by Nonaka and Takeuchi (1995). It involves the intentional combination of individuals with different skills, ideas, and values to generate creative solutions. The advantage, according to Nonaka and Takeuchi, comes because differences prevent the group from falling into routine solutions to problems; the group members do not share a single common solution. Davenport and Prusak and Leonard-Barton cautioned that creative abrasion or fusion requires that the group have some common ground, such as a common language about the problem, and some shared knowledge (called "redundancy" by Nonaka and Takeuchi). Marzano (2005) addressed this in his evaluation of the QSM, saying that within a district implementing the QSM, it was important for individual schools to share the common language of the reform initiative before the new knowledge could be applied.

A fourth way knowledge is generated is through adaptation. Adaptation happens in response to some crisis in the (usually external) environment that acts as a catalyst for change (Davenport & Prusak, 1998). In education, a recent external catalyst for change has been NCLB accountability requirements. Organizations (in this case, schools) that do not adapt in response to changing conditions will fail. Davenport

and Prusak noted that organizations experiencing some success often become complacent and unwilling to adapt. Leonard-Barton (1998) called the tendency of individuals and organizations to stay with familiar routines "core rigidities." An organization's ability to adapt is based on the existence of internal resources and capabilities that can be used in new ways and absorptive capacity or openness to change (Cohen & Levinthal, 1990; Daghfous, 2004; Davenport & Prusak, 1998). Davenport and Prusak said, "The most important adaptive resources are employees who can acquire new knowledge and skills easily" (p. 65). The concept of absorptive capacity will be discussed in more detail in the last section of Chapter 2.

The fifth way that knowledge creation is fostered is through networks, such as professional learning communities and communities of practice. Informal networks can generate a great deal of knowledge and innovation in an organization, but a major drawback is the role of chance in getting information to the place and individuals within the organization where it can be used (Davenport & Prusak, 1998).

In Nonaka and Takeuchi's view of knowledge creation as a process, knowledge is created by individuals. Organizations do not create knowledge, but rather support creative individuals and create a context for them to create knowledge. Nonaka and Takeuchi wrote,

> Organizational knowledge creation should be understood as a process that ... amplifies the knowledge created by individuals and crystallizes it as part of the knowledge network of the organization. This process takes place within an

> expanding "community of interaction" which crosses intra- and inter-organizational levels and boundaries. (1995, p. 59)

According to Nonaka and Takeuchi (1995), knowledge creation results from the dynamic interaction between tacit and explicit knowledge. Their knowledge creation model includes a "knowledge spiral" based on four types of knowledge conversion: socialization (tacit knowledge to tacit knowledge), externalization (tacit to explicit knowledge), combination (explicit to explicit knowledge), and internalization (where knowledge goes from explicit to become tacit). Paavola, Lipponen, and Hakkarainen (2004) summarized Nonaka and Takeuchi's knowledge creation spiral this way:

> The knowledge creation spiral starts from socialization, sharing tacit knowledge and experiences at the group level. In this phase a close interaction and collaboration within a group is needed. The aim of the socialization process is to create common understanding and trust within the group. The next phase, externalization, is the central one in knowledge creation. In this phase, tacit knowledge is explicated and conceptualized by means of metaphors, analogies, and concepts. [T]he basic source of innovation is tacit knowledge, which needs to be explicated in order to be transformed into knowledge that is useful at the levels of the group and the whole organization. At the combination stage, units of already-existing explicit knowledge are combined and exchanged. Finally, to have real effects in an organization, the explicit knowledge of the group or organization must be internalized by

> individuals and transformed into tacit knowledge and into action through "learning by doing." After internalization, a new round of the knowledge spiral will begin. (p. 559)

Nonaka and Takeuchi (1995) described five enabling conditions that promote the spiral of knowledge creation. They are intention, autonomy, fluctuation and creative chaos, redundancy, and requisite variety. According to Nonaka and Takeuchi, the spiral process of knowledge creation begins with organizational intention, which is then turned into a strategy. "The most critical element of corporate strategy is to conceptualize a vision about what kind of knowledge should be developed and operationalize it into a management system for implementation" (p. 74). Further, Nonaka and Takeuchi said, "Organizational intention provides the most important criterion for judging the truthfulness of a given piece of knowledge. If not for intention, it would be impossible to judge the value of information or knowledge perceived or created" (p. 74). This points again to the importance of the creation of a school district shared vision as a first step in implementation of the QSM.

The second condition for knowledge creation is individual and work team autonomy (Nonaka & Takeuchi, 1995). Autonomous individuals and teams are more motivated to create new knowledge. Original ideas emanate from autonomous individuals, diffuse within the team, and then are adopted by the organization. The third condition for knowledge creation is characterized by "fluctuation and creative chaos." Fluctuation is different from disorder, because while it represents a change in the operational environment and signals coming into an organization, it is still orderly.

Fluctuation causes a breakdown in the organizational habits and routines and provides the opportunity for individuals to reexamine their mental models, which results in knowledge creation. Chaos occurs in organizations when they face a real crisis, such as changes in the market served. *Creative chaos* is the term for intentional unsettling of the organization for the purpose of "focusing the attention of organizational members on defining the problem and resolving the crisis situation" (Nonaka & Takeuchi, p. 79). Some might say that NCLB requirements were a federal attempt to generate creative chaos in education. Importantly, Nonaka and Takeuchi pointed out that the benefits of creative chaos can only be realized when organizational members have the chance to be reflective on their actions, and without reflection, fluctuation tends to lead to destructive chaos instead.

The fourth condition described by Nonaka and Takeuchi (1995) for knowledge creation is redundancy, or intentional overlapping of information and knowledge. Rather than being duplicitous or wasteful, redundancy means sharing concepts created by one individual or group with others who may not immediately need the information. This process triggers sharing of tacit knowledge and speeds up knowledge creation. "Redundancy of information provides the organization with a self-control mechanism to keep it headed in a certain direction" (Nonaka & Takeuchi, p. 79), because individuals see a bigger picture of the operation of the organization. Two drawbacks to redundancy of information as a knowledge creation strategy are the danger of information overload on individuals, and an increase in the cost of knowledge creation for organizations. The final condition for knowledge creation

described by Nonaka and Takeuchi is requisite variety. They said, "Everyone in the organization should be assured of the fastest access to the broadest variety of necessary information, going through the fewest steps" (p. 81) and "when information differentials exist within the organization, organizational members cannot interact on equal terms" (p. 82).

2.6.5 Individual and Organizational Knowledge Use

This section begins with individuals as knowledge users and then moves to a review of knowledge use in organizations. The section includes a review of the research on the use of technology to facilitate knowledge use, especially for geographically dispersed organizations, which has implications for rural, isolated school districts.

Peter Drucker (2001) made the observation that the essence of management is understanding how existing knowledge can best be applied to produce new knowledge. In a benchmarking study conducted by the American Productivity and Quality Center (APQC) in 1999, researchers found that 51% of knowledge sharing in organizations was through formal processes while another 39% was ad hoc, more tacit, and more likely to be shared within the structure of a community of practice (CoP). They also found that 10% of organizational best practices are never shared (APQC, 1999). Nonaka and Takeuchi's knowledge creation spiral includes knowledge sharing during both the externalization and the combination stages. Leonard-Barton (1998) called the knowledge codification and coordination functions *knowledge building* and named shared problem-solving, experimenting, and implementing as key

activities for knowledge building. Knowledge transfer was also called *knowledge linking* by Choo (1998) and included interaction with partners and stakeholders and transfer of knowledge both internally and external to the organizations.

March and Simon (1993) said that individual decision making and rational choices are the foundation of organizational decision making. Ideally, rational choice involves a complete search of available alternatives, reliable information about their consequences, and consistent preferences to evaluate the outcomes. However, organizational decision making is limited by the capabilities of individuals, called by Herbert Simon (1997) the principle of bounded rationality. Simon said, "The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world" (p. 198). Further, he said that the limits of an individual's capacity for rational decision making are dependent on three things: mental skills, habits, and reflexes; extent of knowledge and information possessed; and values or perceptions/conceptions that may or may not be congruent with the organizational goals. Covey (1989) observed that because individuals listen autobiographically (i.e., framed by their mental models), they respond to messages in one of four ways: by evaluating—either agreeing or disagreeing; by probing—asking questions from the individual's own frame of reference; by advising—giving counsel based on personal experience; or by interpreting—trying to figure out another's motives or behavior.

Choo (1998), March and Simon (1993), and Thompson (2003) described individual decision-making behavior as a result of bounded rationality. First, the individual satisfices or looks for a solution or course of action that is satisfactory or good enough, rather than seeking the most optimal solution. A course of action is considered satisfactory if it exceeds some minimally established criteria. The second thing done by individuals (and organizations as well) in decision making is to simplify the decision process by applying routines, rules, and heuristics in order to reduce uncertainty and cope with complexity.

Choo (1998, p. 15) described three models of organizational knowledge creation and use. They are sense making, knowledge creating, and decision making. The sense-making model sees the organization as trying to make sense of a dynamic environment wherein individuals draw on their mental models to make meaning and interpret the environment. Sense making is always retrospective, resulting in shared interpretations of what happened, used to guide action. The knowledge-creating model sees the organization as continuously engaged in knowledge conversion from tacit to explicit knowledge that can be used by the organization. The outputs are new knowledge and organizational capabilities. The decision-making model sees the organization as a rational decision-making system, where decision behavior is precipitated by identification of a problem. According to Choo, the three models of organizational knowledge use are mutually supportive:

> The sense-making view shows how organizational members make sense of what is happening in the organization's environment.... The knowledge-

> creating view shows how the personal, tacit knowledge of individuals may be unlocked and converted into explicit knowledge that moves organizational innovation.... Finally, when understanding and knowledge converge on action, organizational members have to choose between available courses of action. The decision-making view shows how such choices are made, given that decision makers are limited in their cognitive and information-processing capabilities. (p. 17)

Cross and Prusak (2005) applied the metaphor of a market to knowledge and characterized it as having both economic and political value that is bought, sold, and bartered within organizations. They said,

> Like markets for goods and services, the knowledge market has buyers and sellers who negotiate to reach a mutually satisfactory price for the goods exchanged. It has brokers who bring buyers and sellers together and even entrepreneurs who use their market knowledge to create internal power bases. (p. 455)

They went on to say that knowledge markets in most organizations are inefficient for several reasons. It is difficult to know ahead of time the quality of the knowledge up for purchase, and in other cases, it can be difficult to locate a source willing to sell. In addition, uncertainties exist regarding the likelihood for eventual payment for knowledge (Cross & Prusak, 2005).

Traditional bureaucratic organizations by their design are much more likely to stifle the flow of knowledge through and within the system. Traditionally, knowledge

flows were vertical from supervisor to supervisee along the lines of the organizational hierarchy. According to Dalkir (2005, p. 185), "[Organizational] culture is a key component of ensuring that critical knowledge and information flow within the organization … Organizations today need to change their culture to one that rewards the flow of knowledge horizontally as well [as vertically]."

Replication of the QSM is heavily dependent on individual and organizational knowledge sharing and transfer rather than the creation of new knowledge. O'Dell and Grayson (1998) identified five characteristics of organizations that support knowledge transfer. They include a process-improvement orientation; a common methodology for improvement and change; the ability for individuals within the organization to work effectively in teams; the ability to capture learning; and technology to support the collection of best practices and organizational knowledge and for collaboration (p. 75). In terms of rewards for knowledge sharing, O'Dell and Grayson found in their studies that intrinsic and intangible rewards were more valuable: "If the process of sharing and transfer is not inherently rewarding, celebrated, and supported by the [organizational] culture, then artificial rewards won't have much effect, and can make people cynical" (p. 82). Good intrinsic rewards for knowledge transfer include greater ease in achieving work objectives, peer recognition, and greater work satisfaction. O'Dell and Grayson called recognition the currency of choice for knowledge sharing.

O'Dell and Grayson (1998) used the word *synergistic* to describe the relationship between technology and knowledge management. They claimed that when organizations became disillusioned with their knowledge management success,

the chief reason seemed to be overemphasis on technology-based solutions that didn't take into account the human aspects of knowledge creation, transfer, and use in groups and at the organizational level. Early studies of virtual communities done by Ardichvili, Page, and Wentling (2002) found that employees were reluctant to share their knowledge and that the success of knowledge exchange depended on organizational culture and climate. Knowledge does not necessarily flow easily in an online environment, even when an organization makes a concerted effort to facilitate the exchange (Ardichvili et al., 2002; Davenport & Prusak, 1998). However, virtual communities of practice are becoming more common as a knowledge management tool among large organizations with geographically dispersed workers. The concept also has merit in a discussion of knowledge creation and use in rural school districts where school professionals do not have opportunities for face-to-face meetings and where virtual communities of practice supported by Internet technology are one of the few viable alternatives to face-to-face conversations and networking activities.

Davenport and Prusak (1998) echoed O'Dell and Grayson's opinion (1998), saying that technology alone did not make an organization effective at creating or using knowledge. The greatest value of technology is its ability to distribute knowledge and to enhance the speed of transfer. Technology is useful for codification of knowledge, and, as described in some communities of practice examples, can be used in the process of knowledge generation. With a skilled facilitator, videoconferencing can even enable the transfer of tacit knowledge. Davenport and Prusak advised that in selecting technology for knowledge management, it is the role

of people interacting with the technology that makes it successful. "The key is to understand the limitations as well as the power of technology. It makes connection possible, but does not make it happen" (O'Dell & Grayson, p. 25). It is always people who add the context, experience, and interpretation that transform data and information into knowledge.

Knowledge that is explicit and can be shared can be codified (Davenport & Prusak, 1998) with the goal of putting organizational knowledge into a more accessible form that can be stored for later retrieval and use. The question becomes what to codify and how, so that knowledge remains vibrant, rather than becoming simply data or information. Within the QSM, there are a number of examples of codified knowledge such as a school district's shared vision, Individual Learning Plans for students, Professional Growth Plans for teachers, standards-based lesson plans, district standards for student achievement, and the standards-based student report card. Davenport and Prusak acknowledged that a tension exists between capturing and codifying the tacit, rich, and complex knowledge that has the greatest potential benefit to an organization and the difficulty of representing the knowledge effectively. The most tacit, inarticulate, and complex knowledge is the hardest to codify. "This is why the codification process for the richest tacit knowledge in organizations is generally limited to locating someone with the knowledge, pointing the seeker to it, and encouraging them to interact" (Davenport & Prusak, p. 71). This is the basis for most mentoring efforts in the education profession; providing access to

individuals with important tacit knowledge is generally more efficient than trying to capture and codify the knowledge electronically or on paper.

2.6.6 Knowledge Management in Education

Senge et al. (2000) claimed that schools, because of their industrial-age background, are the one place where knowledge is fragmented and separated into isolated categories. This is antithetical to a systems view, the view often preferred in traditional Native ways of knowing, where knowledge is composed of relationships, not isolated bits of data and fragments of information. In the tradition of Western schooling, teachers have been taught to work alone. It does not facilitate knowledge transfer or sharing when the norm is for little sharing across grade levels or subject areas. Fullan (2001a) characterized the current state of knowledge building and sharing within education by saying, "It is ironic that school systems are late to the game of knowledge building.... for their teachers. Most schools are not good at knowledge sharing within their own walls, let alone across schools in the same district" (p. 104). He said that while knowledge networks on a national level, such as professional organizations, are better developed, it is the local knowledge networks that count because that is where knowledge becomes specific and useful.

Senge et al. (2000) elaborated on the importance of knowledge networks by stating, "Knowledge and learning—the processes by which people create knowledge—are living systems made up of often invisible networks and interrelationships" (p. 21). Further, they said that in order to improve school systems, it is more important to look at the way people think and interact because schools, like

all organizations, are deeply influenced by the kinds of mental models and relationships at large in the system. Mental models are usually tacit and reside just below individuals' level of awareness, often unexamined. Because individuals rarely share the same mental model (each one has a unique understanding), some authors (Nonaka & Takeuchi, 1995; Senge et al., 2000) believe it is critical to knowledge creation and sharing for individuals to become aware of their own mental models. Senge et al. said that the two skills most critical for working with mental models are reflection (slowing down thinking processes to become aware of how mental models are formed), and inquiry (holding conversations to share views and develop knowledge about each other's assumptions).

During the second wave of education reform, the concept of learning communities for teachers became popular. That popularity has not diminished, though the focus of the knowledge activities has changed over time. Dalkir (2005) said, "Knowledge sharing communities are not just about providing access to data and documents. They are about interconnecting the social network of people who produced the knowledge" (p. 131). Sveiby and Simons (2002) stated that a collaborative climate was one of the major factors influencing the effectiveness of knowledge work. Choi (2006) defined *community of practice* as a "group of people who have a common theme or purpose and spontaneously gather together to create a trust-based community that creates and shares practice" (p. 144). "The critical components of a community of practice are sharing of common work problems between members, membership that sees clear benefits in sharing knowledge among

themselves and that has developed norms of trust, reciprocity, and cooperation" (Dalkir, 2005, p. 123). One of the main reasons communities of practice are efficient tools for knowledge generation and sharing has to do with the amount of intangible, tacit knowledge held by employees. Tacit knowledge is embedded in stories people tell during CoP activities. Ardichvili et al. (2002) stated that one of the best ways to help people share tacit knowledge is through sharing their experiences while working on specific problems within the CoP.

While the research of Ardichvili et al. (2002) focused exclusively on communities of practice that were geographically dispersed, there is more empirical literature about the benefits and lessons learned from site-based learning communities. Choi (2006) studied factors that facilitated CoP activity among identified CoP members at Samsung Electronics Corp. She used a survey to assess and rank the factors from a sample of 297 participants representing 81 communities of practice. She concluded that degree of trust within the CoP was one of the most important factors for sharing tacit knowledge. The other factors that encouraged ongoing participation of CoP members were individual learning motivation, the creation of work-related knowledge and sharing of expertise that was possible within the CoP structure, and the leadership traits and skill of the CoP leader.

By circumstance rather than deliberate design, many rural schools in Alaska share features with consciously created smaller learning communities in urban centers. For example, rural teachers often share teaching and learning with students over a longer period of time during the day, stay with the same students more than one year,

and have the opportunity for developing positive relationships with students that are an acknowledged benefit of smaller learning communities. Whether urban or rural, there are some conditions more likely to generate successful learning, knowledge creation, and knowledge transfer within the professional learning community. Supovitz and Christman (2005) used case study research to evaluate the effectiveness of learning communities formed in two large urban school districts and concluded that professional teams needed skillful guidance from leaders who understood the process and how to structure learning for teachers. In addition, the most successful professional learning communities had legitimate authority for the consensus they achieved and a degree of autonomy. Last, members of the learning communities benefited from professional development experiences to enlarge their contribution to the learning community.

Achinstein (2002) maintained that advocates of CoPs underplayed the reality of conflict within groups. Rather than viewing conflict as a negative condition, she emphasized that within CoPs, conflict could lead to critical reflection and ultimately continuous improvement. She cautioned against group-think, where group members accept various assumptions without questioning them in the guise of achieving consensus and avoiding conflict and ultimately leave an organization unchanged. Three areas where conflict may surface in CoPs are preference for consensus versus comfort with critical reflection that may include argument and challenge of the status quo; group boundaries, meaning who and what belong to the group or are excluded; and differences in professional beliefs and practice (Achinstein, 2002). She concluded

that these three factors "played an essential role in organizational learning that impacted structures, reform efforts, norms, and the whole school community" (p. 446). Further, she stated,

> Critically reflecting on conflicts within a school enables the potential for the kind of organizational learning and change advocated by reformers. An embracing stance towards conflict involves a community in an inquiry process that explores divergent beliefs and practices of the community; acknowledges and owns responsibilities for conflicts that may result; opens the borders to diverse members and perspectives; and, at times, questions the organization's premises to change them. (p. 447)

In a study designed to learn about the culture of data-based decision making in schools and determine implications of teacher decision-making practices for implementation of standards and accountability policies, Ingram, Seashore, and Schroeder (2004) hypothesized that schools with a more pervasive culture of continuous improvement would show greater evidence of use of systematic data for decision making. However, they concluded that the reality of the school political environment made it difficult for schools to practice continuous improvement related to data. Ingram et al. found that there were seven barriers to establishing a school culture supportive of use of data for decision making, which they grouped into three main categories: cultural, technical, and political challenges. Cultural challenges related to the use of data for decision making included the idea that teachers already have personally developed anecdotal methods for determining their own effectiveness.

Additionally, many teachers and administrators operated from a framework of past experience and intuition to make decisions, rather than using systematically collected information. There was little agreement about what was relevant and valid data among stakeholders, and finally, many teachers disassociated their own performance from that of students, which caused them to overlook or dismiss some data or connections between data.

Technically, even when teachers identified data they wanted and needed, either it was hard to get, or else no measurement tool or method currently existed in the school system to capture the data. Another technical issue was time. The school day rarely contained time for the collection or analysis of data. Concern over time to collect data was similarly noted by Marzano (2005) in his evaluation of the balanced instruction component of the QSM. Last, Ingram et al. (2004) noted a mistrust of data and a practice of data avoidance among respondents that they attributed to the historical use of data in systems for political purposes. The use of data to support a decision or course of action, they claimed, has often been political rather than geared toward discovering problems and determining possible courses of action. They concluded by making a distinction between data use as called for in continuous improvement literature and the political realities of data use in school systems for decision making. In the continuous improvement paradigm, data are used to measure the effectiveness of processes and to determine alternatives that might improve processes, while in reality, in schools, which are actually quite political, data are used to justify particular positions or actions.

2.6.7 The Influence of Culture on Knowledge Activities

Hofstede (1991) said that culture permeates both management and organizations. Factors related to intercultural communication seem to have an influence on organizational knowledge building and transfer, though Taylor and Osland (2003) found that there was a lack of research on the impact of intercultural communication in organizational learning. They wrote about the organizational learning and knowledge transfer problems faced by multinational companies. Much of their discussion also applies to school districts operating in Native communities in Alaska. Taylor and Osland said that all knowledge transfer is affected in the communication process by culture. Sender- and receiver-related factors influence how messages are perceived and interpreted, and they act to filter the exchange of ideas in multicultural organizations. Communication is a factor in how an organization learns from individuals within it and in how the organizational mental models (operating procedures, overt rules of behavior, organizational culture) are transferred to the same individuals.

One of the sender-related intercultural communication barriers identified by Taylor and Osland (2003) is marginality of the sender, which in this context refers to people who have internalized two or more cultural frames of reference (R. Barnhardt, 1992). Marginal people are often sought out for boundary-spanning or mediating roles, in this case between the school and the Native community. Unfortunately, the knowledge or voice of marginal individuals is sometimes discounted because they are not "members" of the dominant coalition in an organization, even though, ironically,

they may have a more accurate view of events and circumstances than others do. Marginal or boundary-spanning individuals in a rural school district might include Alaska Native paraprofessionals or classroom aides from the local community. Members of the dominant culture can also become marginalized when they do not have proximity to the central office, as may be the case for a principal/teacher in a small village.

Stereotypes are the second sender-related intercultural communication barrier described by Taylor and Osland (2003). They affect the sender's ability to communicate messages because they interfere with the ability to be heard in the organization and have a message accurately judged. Likewise, the senders' stereotypes about the receiver may determine how much and what kind of information they are willing to share. O'Dell and Grayson (1998) advised that

> one of the strongest predictors of best practice transfer was the relationship between the source and recipient. The potential adopter of a best practice (the recipient) has to believe that the source is credible and knows what he or she is talking about. (p. 73)

The stereotypes of individuals can inhibit organizational as well as individual learning. Hanson and Lynch (1990) applied this factor to the example of an early childhood interventionist who must interact with parents from a different cultural background than his or her own to gather information about the child.

A third factor affecting communication in multicultural organizations is style differences. An individual's cultural and ethnic identity influences his or her verbal

and nonverbal communication style and patterns. Cultural communication styles include features such as meaning conveyed through context versus use of words and use of a direct message versus an oblique one where meaning comes from nuances of speech and manner. Senders and receivers from different cultural groups may differ in their perception and preference for the number of words necessary and how they are used to convey meaning, ranging from very succinct to exactly the right amount to elaborate speech with high quantities of talk. People with a succinct style may discount an elaborate speaker as too wordy and stop listening, while an individual with an elaborate style may assume a succinct individual has little to say or contribute. The last sender-related intercultural communication factor described by Taylor and Osland (2003) is linguistic ability. Because the transaction costs are higher in exchanges where individuals are not easily understood, most people will either restrict their communication to, or prefer to communicate with, those who speak their own language. This includes not only conversational use of language but also understanding of specialized language (i.e., that which is related to education).

Wilson (1996) found that communication styles also include a person-oriented or status-oriented preference, where person-oriented is more informal and equalitarian and status-oriented is very conscious of power, hierarchy, and formality between sender and receiver. Another feature of different cultural communication styles described by Wilson is either self-enhancement or self-effacement. In self-enhancing cultures, it is common for individuals to boast of their achievements and

accomplishments, while in self-effacing cultures to do so is distasteful. Individuals from self-effacing cultures may be very modest about knowledge they have acquired.

Taylor and Osland (2003) defined two receiver-related intercultural communication barriers that can occur in organizational learning: cosmopolitanism and satisficing. Cosmopolitanism refers to orientation to the outside world as opposed to localness. In an organization, cosmopolitanism is closely linked to the concept of absorptive capacity, which is the ability of an organization to recognize the value of new, external information and integrate it into existing knowledge. A receiver who has a local orientation, on the other hand, would not seek or welcome information relevant to organizational learning from external sources (i.e., the community or another remote school site) because of lack of interest and curiosity—and potentially would miss valuable input. Satisficing is the second receiver-related intercultural communication factor. Satisficing means accepting something that is good enough because the costs of maximizing are too great. In organizational learning, satisficing happens when individuals or whole organizations believe they know enough to get by (e.g., embedding cultural proficiency training into new teacher training conducted once a year). Individuals are most likely to exhibit satisficing behavior when their focus is restricted to short-term goals.

Shared by both senders and receivers in intercultural communication are factors of intercultural sensitivity and level of readiness to engage in intercultural communication (Lindsey, Robins, & Terrell, 2003; Taylor & Osland, 2003; Wilson, 1996). Intercultural sensitivity represents a composite of the sender and receiver

factors just described. As individuals and organizations move through stages of sensitivity, they move from being ethnocentric (where one's own culture is central to reality) to becoming ethnorelative (where one's own culture is experienced within the context of other cultures).

Taylor and Osland (2003) postulated that there are correlations between intercultural sensitivity factors and the readiness to transfer knowledge to benefit organizational learning in intercultural settings. They summarized the correlations by saying,

> we would expect ethnocentric organizations and individuals to show a greater tendency to marginalize other organizational members and units, to be more prone to stereotyping, and to be less tolerant of communication style differences and less flexible in adapting to other styles. We would also expect them to be less cosmopolitan and show a greater tendency toward satisficing. (p. 225)

Taylor and Osland concluded by saying that organizations and individuals within them generally need a trigger event or catalyst to move from being ethnocentric to becoming ethnorelative. A trigger event can be something new or novel that is experienced or a discrepancy (such as in disaggregated student achievement scores prompted by NCLB accountability). A third type of trigger event that can lead to more ethnorelative cultural sensitivity is a deliberate initiative in response to either an internal or external request for an increased level of conscious attention. Examples of deliberate initiatives include development and use of Alaska's *Standards for*

Culturally Responsive Schools and implementation of the QSM with its focus on cultural context and sensitivity.

2.6.8 Knowledge Management Summary

Individuals are at the heart of organizational learning, knowledge creation, and knowledge transfer. Individual knowledge management is messy, vacillating between seeking, organizing, transferring, and using knowledge (Choo, 1998). Senge et al. (2000) called learning the processes by which people create knowledge and said that knowledge and learning are living systems made up of networks and interrelationships that are often invisible in an organization. "Fields of knowledge do not exist separately from each other, nor do they exist separately from the people who study them" (Senge et al., p. 21). If knowledge is an organization's most important asset (Birkenshaw, 2001), then it follows that in organizations with a high rate of employee turnover, such as rural Alaska school districts, creating a learning organization and processes for knowledge management would be one of the most critical challenges. Further, lack of attention to knowledge functions might have a disabling effect on any school reform effort.

O'Dell and Grayson (1998) identified four enablers of knowledge management: culture, technology, infrastructure, and measurement. All four need to be managed in harmony with one another. They said,

> If the technology allows sharing, but the culture says, "keep what you know to yourself," transfer won't happen. If there are no designated knowledge champions and facilitators, even a company with a pro-sharing culture may not

> succeed. If there is no process for designing and managing change, good intentions will flounder. (p. 26)

There are two knowledge concepts that can found within the success or failure of any change initiative or reform, at either or both the individual and the organizational level: absorptive capacity and sticky transfer. Those concepts will be described in the next section of Chapter 2 within a discussion of change.

2.7 Change Theory and Research

Senge et al. (2000) noted that even though history has proven false or discounted many of the broad statements contained in *A Nation at Risk*, the perception of schools in crisis remains. And while no one really knows what the world of work or global culture will look like in 18 years when a new group of kindergarten students are of likely age to graduate from college, the safest prediction is change (Senge et al., 2000). They summarized the conditions of the third wave of education reform by saying,

> Struggling to keep up with these kinds of demand, school leaders continually place their [organizations] on the frontier of change. Yet schools also face intense pressure to slow down change, to be conservative, to reinforce traditional practices, and not to leave anyone behind. (p. 10)

There are three reasons that change and innovation are more difficult to sustain in education than in business, according to Senge et al. (2000). First is that schools are more purely industrial-age institutions; second, schools are more tightly embedded in larger social systems; and last, we are all (educators, parents, and community

members) a product of the industrial-age school, with accompanying mental models of the experience. In new experiences, most people tend to hear and remember only the information that reinforces their existing mental models. Mental models can limit people's ability to change, or, in other words, limit their absorptive capacity. Even when individuals embrace policy innovation, they may "do ambivalence" (Åkerström, 2006) as a way to both comply with and subtly criticize new policies.

2.7.1 Individual and Organizational Absorptive Capacity

Integral to the discussion of implementation of education reform is the concept of absorptive capacity. Cohen and Levinthal (1990) defined organizational absorptive capacity as "the ability of an [organization] to recognize the value of new, external information, assimilate it, and apply it" (p. 128). Absorptive capacity is important, as most organizational innovation results from borrowing rather than invention (March & Simon, 1993). The QSM is a good example of a borrowed innovation. The premise behind absorptive capacity is that an organization or individual needs prior related knowledge to assimilate and use new knowledge. New knowledge is linked to preexisting concepts before it can be extended, expanded, and used. "The ability to assimilate information is a function of the richness of the pre-existing knowledge structure: learning is cumulative and learning is greatest when it is related to what is already known" (Cohen & Levinthal, p. 131). Teachers recognize this when they conduct a task analysis to determine the extent of understanding of prior knowledge as part of designing and individualizing instruction for students.

Cohen and Levinthal's (1990) definition of absorptive capacity also includes the ability to use knowledge as well as acquiring or assimilating it. An organization's absorptive capacity depends on the absorptive capacity of its individual members. From an organizational standpoint, it pays to develop the absorptive capacities of individual members of the organization. An early and ongoing investment in developing employees' absorptive capacities will subsequently position the organization to assimilate and adapt new knowledge more quickly and effectively.

Cohen and Levinthal (1990) provided some insight into the challenges of implementation of a new (and novel) education reform initiative. They stated that boundary-spanning individuals at the nexus between the organization and the external environment are often the gatekeepers for knowledge coming into the organization. If those individuals do not possess a high absorptive capacity relative to the new information, it may not be brought into the organization. Cohen and Levinthal advised that organizations would be prudent to diffuse the boundary with the external environment to the largest extent possible to increase the possibility that new information will reach all of the individuals in the organization with the requisite absorptive capacity for it. Levitt and March (1988) noted that in some cases, organizations will reject a new idea or procedure if they are experiencing results with an inferior process with which there is a lot of experience. They said, "a competency trap can occur when favorable performance with an inferior procedure leads an organization to accumulate more experience with it, thus keeping experience with a superior procedure inadequate to make it rewarding to use" (p. 322).

It follows from Cohen and Levinthal's theory of absorptive capacity that if a school district and its stakeholders have some experience already with some form of education reform, implementation of the QSM should be easier to achieve because of a higher absorptive capacity for the new knowledge. McKinney (2003) studied the readiness of school systems to adopt change (their absorptive capacity), such as the QSM, with a particular focus on Alaska's rural schools. Her study resulted in the development of a profile to assess readiness for organizational change. It was intended to provide a measure of the inertia to change present in a school setting as a way of anticipating the success of the introduction of a school reform such as the QSM. McKinney found that staff members in rural communities and villages had a higher receptivity to change, yet change in rural areas was hampered by the frequent turnover of staff and administration. Frequent staff turnover would seem to be a major obstacle to sustaining organizational absorptive capacity for implementation of education reform unless new staff members enter the organization with some prior knowledge of reform that they can use to make sense of and participate in the initiative.

2.7.2 The Challenges Inherent in Change

Change represents a push–pull process between forces that promote the change and those that inhibit or stop it from growing. Senge et al. (1999) described profound change as a combination of shifts in individual values and beliefs (inner change) and shifts in organizational processes, practices, and systems (outer change). "In profound change there is learning. The organization doesn't just do something new; it builds its

capacity for doing things in a new way … it builds capacity for ongoing change" (p. 15).

One of the main obstacles that can hinder knowledge sharing within organizations and the development of organizational capacity for change is the idea that knowledge is property, with ownership. Another obstacle is the view that knowledge is power, perpetuated by organizational practices of rewarding individuals for what they know, not what they share. Other knowledge-sharing obstacles include the knowledge provider's lack of confidence that the receiver will understand and use the knowledge correctly and/or recipients' lack of confidence in the truth or credibility of the knowledge in question or the knowledge sender. As discussed earlier in this chapter, organizational culture shapes and determines the communication within the organization. "The culture often determines who talks with whom, when, and what the conversation covers. Organizational culture is holistic, historically determined, socially constructed, and difficult to change" (Dalkir, 2005, p. 181).

Senge et al. (1999) identified 10 challenges to change that represent the system "pushing back" against or opposing change. Each of the 10 challenges represents normal opposition to change, though not all are necessarily encountered in a given change setting. The challenges are grouped into challenges of initiating (not enough time, no help, perceived irrelevance, and disconnect between leadership talk and action), challenges of sustaining momentum (fear and anxiety, outdated measures of success, and marginalization of organizational change agents), and challenges of system wide redesign and rethinking (conflict over power and autonomy, inadvertent

reinvention, and outdated shared vision). The challenges to change are dynamic because they result from balancing all of the change forces with the processes that push back (push–pull). They are nonlinear in that each situation is unique and a challenge from one setting may be presented and resolved totally differently in another setting. The challenges are also interdependent. The push–pull nature of the challenges means that when one challenge is addressed, another may emerge and require attention (shifting dominance). In a positive way, building capacity to handle one challenge can spill over to capacity to handle other challenges. Further, innovative solutions to challenges that work on a small level may help solve a larger challenge in the organization (Senge et al., 1999).

> In discussing why educational change initiatives fail, Fullan (2001b) said,
>
> The problem of meaning is central to making sense of educational change. In order to achieve greater meaning, we must come to understand both the small and the big picture. The small picture concerns the subjective meaning or lack of meaning for individuals at all levels of the educational system. Neglect of the phenomenonology of change—that is how people actually experience change as distinct from how it might have been intended—is at the heart of the spectacular lack of success of most social reforms. (p. 8)

Fullan's comment expresses the essence of Jester's (2002 and 2005) recommendation for further study related to the QSM.

Hargreaves (1997) summarized the reasons for failure of education reform initiatives as resulting from multiple or contradictory initiatives undertaken

simultaneously, "top-down" reform that has been imposed or was designed by just a small group of participants, reform that is out of context with the day-to-day operation of schools and classrooms, and lack of support for implementation at the classroom and individual teacher level. Cuban (1990b) wrote that the failure of reform efforts was often due to a bad fit between the reform initiative and the problems it was intended to address. First, he said applying a solution should end a problem. If the problem persists or recurs, the solution (reform) must not have worked to solve the intended problem. Second, there may have been a mismatch between the problem and solution—either the problems identified as being important were not the real problems that needed solving, or the solution applied to them was really intended to address different problems. Alternatively, the problems themselves could actually be more deeply rooted, where solutions must include hard choices between conflicting values. Cuban said problems of the third type are seldom resolved but instead are "managed" through compromise.

The culture of the school is an important factor in the success of reform efforts. Hargreaves (1992) examined the effects of providing additional release time for elementary teachers in Ontario, Canada. The additional time reduced stress and allowed for more creative work. He also found, however, that the additional time didn't necessarily increase collegiality among teachers because teachers considered the time too rare and precious to "waste" in talking with colleagues. Hargreaves also found that not all teachers wanted more time away from students, and that when substitute teachers or assistants were brought in to free up teacher time, teachers did

not share responsibility well. In peer coaching situations, teachers felt insecure and had doubts about their own expertise.

2.7.3 Sticky Transfer

The culture within a school or district can have a large effect on knowledge activity. Even when individuals in an organization have the absorptive capacity to recognize and assimilate new knowledge and innovations, they might encounter difficulty in "selling" the idea to others in the organization, in knowledge market parlance. Szulanski (2003) used the term *stickiness* to refer to both the qualities of knowledge being transferred and the characteristics of the transfer situation. Knowledge transfer that becomes sticky gains eventfulness in direct proportion to its stickiness. Szulanski explained, "Complex transfer problems are likely to require additional deliberation, recourse to non-standard skills, allocation of supplemental resources and escalation of transfer-related decisions to higher hierarchical levels for resolution" (p. 14).

Szulanski (2003) researched factors that could impede knowledge transfer, using a survey to gather data from 271 participants related to the transfer of 38 identified best practices in eight business organizations. He triangulated the survey data with case studies in three of the organizations that included interview questions and data collection standardized across the sites. He concluded that there were nine correlates between knowledge and stickiness of transfer that occurred during four phases of knowledge transfer. The correlates defined by Szulanski were as follows:

1. Causal ambiguity. Causal ambiguity refers to an incomplete understanding of the knowledge being transferred and which knowledge is valuable and critical to the transfer. "Successful replication of results, in a novel setting, may be compromised by idiosyncratic features of the new setting in which the knowledge is used" (p. 25), and "Routinized use of causally ambiguous knowledge is often accompanied by gaps between formal [expected] and actual patterns of knowledge use" (p. 26).
2. Absence of proof of the usefulness of the knowledge being transferred.
3. & 4. Lack of motivation of the source of the knowledge, or conversely lack of motivation of the recipient.
5. Lack of credibility of the source of the knowledge.
6. Lack of absorptive capacity of the knowledge recipient.
7. Lack of retentive capacity of the recipient of the knowledge. This could be due to employee turnover and/or inability to institutionalize new knowledge.
8. A "barren organizational context" that positively correlates to knowledge transfer stickiness. The organizational context is influenced by its formal structure and systems, sources of coordination and expertise, as well as behavioral norms.
9. An arduous relationship between the source and recipient of the knowledge creates transfer stickiness.

The knowledge transfer stickiness factors identified by Szulanski (2003) occur within four stages of the knowledge transfer process. The four stages of knowledge

transfer are initiation, implementation, ramp-up, and integration. "Initiation stickiness is the difficulty in recognizing opportunities to transfer knowledge and in acting upon them" (Szulanski, p. 35). During implementation of a knowledge transfer, transfer-specific ties are established between the source and recipient of the knowledge, with information and resources flowing to the recipient. According to Szulanski (p. 36), "The eventfulness of the implementation stage depends on how challenging it is to bridge the communication gap between the source and the recipient and fill the recipient's technical gap." During the ramp-up stage, the recipient begins to use the newly transferred knowledge, and the main concern is identifying and resolving unexpected problems that, if unaddressed, would impede the optimal use of the new knowledge. "The eventfulness of the ramp-up phase depends on the number and seriousness of unexpected problems and the effort required to solve them" (Szulanski, p. 37). The later problems occur during ramp-up, the harder they are to solve. Difficulty during ramp-up corresponds to the degree of causal ambiguity of the practice or knowledge being transferred. Positive absorptive capacity of the recipient is critical during the ramp-up phase. Integration is the last phase of knowledge transfer described by Szulanski, where knowledge becomes routinized in the organization. Integration stickiness can occur when the organizational status quo is disrupted by activities like staff turnover, organizational dysfunction, or the appearance of a new, better alternative solution to the problem. When stickiness is encountered during integration, the newly transferred practice or knowledge may be abandoned and the organization may attempt to revert to the former status quo.

2.7.4 Ambivalence about Reform and Innovation

Åkerström (2006) noted the constraints on education professionals functioning as street-level bureaucrats (Lipsky, 1980) in responding to change and innovation by saying,

> Human service work and the settings in which it is performed are certainly fraught with contradictions, complexities, and constraints. Staff members are not free to respond in any way they want to either the practical demands of everyday situations or to the formal demands of rules and regulations. (p. 58)

This sets the stage for conditional acceptance of policy changes—what Åkerström called "doing ambivalence":

> "Doing ambivalence" is a rhetorical activity through which staff members in human service occupations both comply with and subtly criticize, and thereby, *make* or *create* new policies. They do not simply implement new recommendations from above. Through myriad everyday argument, description, decisions, and actions, staff members … form policy "for all practical purposes" under the auspices of prevailing formal or abstract social policy. (p. 58)

Åkerström (2006) said that examples of ambivalence are seen in professional discourse where individuals first state an initial appreciation of the basic ideas contained in the policy or reform but subsequently express doubts about its ability to work, often in the same interaction. She called integrating innovation "a constant organizational challenge" because it requires individuals to change their duties, their

conduct, and even their identities. Adopting a "yes, but" stance allows professionals to follow policy directives and implement change while at the same time holding onto previous work patterns, orientations, and commitments. Åkerström concluded from her research with acceptance of policy changes in juvenile rehabilitation centers that

> Staff members employed an accommodative rhetoric that allowed for the integration of competing organizational discourses and policies. Specifically, staff members were able to implement the new … policy without totally accepting the new policy or completely abandoning the old ways. The "yes, but" stance provides a way of integrating the new with the old, of bringing innovation into the organization without totally disrupting established ways of functioning. (p. 71)

The value of ambivalence is that it not only allows schools and school districts to integrate reform and policy changes into the ongoing work and structure of education, but also helps teachers and administrators integrate themselves into new ways of doing things. Åkerström maintained that by conditionally implementing new policy or reform, teachers and administrators, functioning as street-level bureaucrats, were actually participating in shaping or making social policy, even though their charge was only to implement policy. She concluded, "So, ultimately, social policy takes shape from its practical implementation, not merely its abstract presentation" (p. 72).

2.7.5 Qualities of Successful School Reform Initiatives

Cho, Kelleher, Wright, and Yackee (2005) studied the local implementation of national welfare policy reforms and concluded that there were two factors responsible for effective implementation that could be generalized to other public services. The first factor was professional experience and expertise, and the second was a perception of empowerment. Cho et al. found that where the professionals responsible for implementation had more professional training (i.e., beyond a bachelor's degree) and more years of job experience, the degree of implementation went up. They also concluded,

> The second major contributor to explaining levels of effective implementation comes from the empowerment perceptions among local implementation networks, both within and beyond the linkages of the professionals. The perception of enhanced authority fosters an increase in the judgments about goal achievement. Devolution, the sense of expanded local authority and discretion, and effectiveness were positively associated. (p. 49)

The most important change initiatives share some common qualities (Senge et al., 1999, p. 43): They are connected to real work goals and processes; they are connected with improving performance; they involve the people who have the power to take action on the change goals; they create a balance between action and reflection and connect inquiry with experimentation; they give people time for thought and reflection without pressure to make decisions; they increase people's individual and collective capacity; and they focus on learning about learning.

Hargreaves and Fink (2000) wrote that ultimately there were just three things that matter about education reform, which they posed in the form of questions: One, does it have depth, meaning does it improve important rather than superficial aspects of student learning? By depth, they meant a focus on developing not just higher order thinking skills such as problem solving, but also cultural, emotional, and social (civic) learning. Cultural learning should be two-way—students situating new learning within their cultural context, and teachers learning about and developing a respect and appreciation for their students' culture.

The second thing that matters regarding education reform, according to Hargreaves and Fink (2000), is whether it has length, meaning sustainability over time. Key to sustainability is anticipation of obstacles and ability to overcome them. There are a number of obstacles to long-term sustainability, many of them very familiar to rural Alaska school districts. As stated previously, familiar obstacles include leadership succession and teacher turnover. No matter how solid a school community's shared vision may appear, reform will likely stall or fail if newcomers do not share the passion and commitment of the original reformers. Other challenges to sustainability include changes in the district and policy context. The QSM requires a high degree of professional development and training, which translates to a commitment of resources from the district office. The model functions in a federal and state policy framework of increasing accountability; sustainability of the QSM will depend on ability to change and adapt to those requirements. Yet another variable that affects sustainability is community support. In small, rural communities with a strong

cultural context, building satisfaction among community stakeholders is critical and must be ongoing—not an easy task to sustain if there is frequent turnover in schools, or when NCLB requirements create a condition where paraprofessionals from the local Native community are deemed to be no longer "highly qualified" and schools lose important knowledge assets.

Third, does school reform have breadth, meaning transferability to other schools or school systems? According to Hargreaves and Fink (2000), transplanting an initiative that was successful in one district to other settings is difficult. The initiative must be transformed in the process to fit a new local context. The QSM, so successful in Chugach School District, must conform to a different local reality when used by other schools and districts. "Wholesale structural cloning is inadvisable" (p. 34), according to Hargreaves and Fink. They cited research that shows initiatives are most likely to succeed and transfer to new sites when they have a "persistent emphasis on teaching, learning, and student performance; on partnerships that share and develop expertise—a knowledge network; on extensive professional development; on careful selection of teachers and leaders; and on assessment and accountability" (p. 34).

They liken school reform to a cubist painting with the three dimensions of significance, sustainability, and transferability all viewable at once. Hargreaves and Fink (2000) cautioned against too narrow a focus on student achievement outcomes, saying they don't necessarily signal deeper learning within a cultural context and aren't a substitute for working with all stakeholder groups to create a climate and culture for learning. Last, they recommended that those engaged in education reform

treat the wider policy context as integral to the reform effort by directly addressing policy requirements.

Chapter 3 describes the mixed methodology for this research related to the implementation of the QSM.

CHAPTER THREE: METHODOLOGY

This mixed-methods study with a concurrent nested design measured participants' self-reported beliefs about the importance and existence of four knowledge-related subscales based on Baldrige in Education constructs and examined the degree to which participants considered the knowledge factors to be important and evident in practice as part of the implementation of a comprehensive standards-based approach to school reform known as the Quality Schools Model As described in the Preface section, this study utilized a questionnaire designed by a cohort of four graduate students who each used some of the data to answer individual research questions. Concurrently, a description of the implementation of the QSM was gathered through interviews with 14 additional participants including parents, elders, and other community members. The choice of mixed methodology lent this study what Eisner (1998) called "structural corroboration, through which multiple types of data are related to each other to support or contradict the interpretation and evaluation of a state of affairs... a confluence of evidence that breeds credibility, that allows us to feel confident about our observations, interpretations, and conclusions" (p. 110). This chapter outlines the methodology for this study according to the following organizational framework: Research Questions, Research Design, Participants in the Study, Questionnaire Development and Administration, Analysis of Quantitative Data, Interview Protocol and Administration, Analysis of Qualitative Data, and Chapter Review.

3.1 Research Questions

Utilizing knowledge management concepts found throughout the Baldrige in Education Criteria as the lens through which to view implementation, four research questions served as the basis for this study:

Question 1: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs, *to be important* within the Quality Schools Model of education reform?

Hypothesis 1.1: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between administrators, teachers, and classified staff.

Hypothesis 1.2: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between teachers based on years of education experience and based on years of experience in the QSM district.

Hypothesis 1.3: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between participants based on years of education experience and based on years of experience in the QSM district.

Question 2: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in

Education constructs, *to be in practice* within the Quality Schools Model of education reform?

Hypothesis 2.1: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between administrators, teachers, and classified staff.

Hypothesis 2.2: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between teachers based on years of education experience and based on years of experience in the QSM district.

Hypothesis 2.3: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between participants based on years of education experience and based on years of experience in the QSM district.

Question 3: Are there statistically significant differences in participants' belief scale mean scores and practice scale mean scores for knowledge factors, and are those differences statistically significant between groups?

Question 4: What are the relationships among the Baldrige in Education Criteria that describe the Quality Schools Model?

Hypothesis: Knowledge Management has either a direct or indirect effect on all other Baldrige criteria as shown in the Baldrige theoretical model.

3.2 Research Design

As described in Chapter 1, the theoretical framework for this study was pragmatism, which allows for a mixed-methods approach to data collection and use of a variety of data analysis statistics. A complementary mixed-methods research approach was used to address the research questions where "the results of one method were used to elaborate, enhance, illustrate, or clarify the results from another method" (McMillan & Schumacher, 2001, p. 543). There is growing consensus among researchers that qualitative and quantitative research can complement each other (Gall, Gall, & Borg, 2007). R. B. Johnson and Onwuegbuzie (2004) stated that

> researchers should collect multiple data using different strategies, approaches and methods in such a way that the resulting mixture or combination is likely to result in complementary strengths and non-overlapping weaknesses. (p. 18)

Research strategies that integrate different methods "encourage us to probe the underlying issues assumed by mixed-method" and "produce better results in terms of quality and scope" (Sydenstricker-Neto, 1997, p. 4). Maxwell (1998) argued that the complementary use of qualitative and quantitative approaches

> provides a greater range of insights and perspectives and permits triangulation or the confirmation of findings by different methods, which improves the overall validity of results, and makes the study of greater use to the constituencies to which it was intended to be addressed. (p. 3)

We selected a mixed-methods approach for this research for several reasons. We sought to describe implementation of the QSM as comprehensively as possible,

recognizing the unique cultural perspectives within each setting while acknowledging our own limitations as researchers given the remote geographical setting of each research site. The quantitative component of the research design facilitated reaching the largest possible number of participants and focusing specifically on components of the QSM that were familiar to school staff. The qualitative component allowed both the elaboration of results from the quantitative component and the inclusion of participants for whom the quantitative component was not appropriate given its school-specific content. Further, while the research sites are similar in many ways, they are unique both culturally and geographically. The qualitative component of the research design intended to provide more opportunity for that uniqueness to be reflected in the data than might occur with strictly quantitative methods.

McMillan and Schumacher (2001) used the term *complementary* to describe a mixed-methods approach whereby "the results of one method were used to elaborate, enhance, illustrate, or clarify the results from another method" (p. 543). In order for a complementary approach to be truly beneficial to the research process, it cannot simply include "add-on" components. Complementarity "seeks elaboration, enhancement, illustration, or clarification of the results from one method with the results from the other method" (Greene, Caracelli, & Graham, 1989, p. 257). Identifying mixed-methods research as complementary, however, does not prescribe specific research procedures.

The design of this mixed-methods study employed a concurrent nested strategy, which is distinguished by its use of a single data-collection phase. A

concurrent nested strategy is also guided by a predominant method—in this case, quantitative. Qualitative methods—in this case, interviews—were nested within the predominant method. According to Creswell (2003), "nesting may mean that the embedded method addresses a different *question* than the dominant method, or seeks information from different [*audiences*]" (p. 218). When one is using a concurrent nested strategy, "the data collected from the two methods are mixed during the analysis phase of the project" (p. 218).

3.3 Participants in the Study

A description of each of the three rural Alaska school districts in this study was provided in Chapter 1; therefore the focus in this section is on describing the study participants. All administrators, teachers, and support staff with district e-mail accounts in the Bering Strait, Lake and Peninsula, and Kuspuk School Districts were invited to complete the questionnaire. Completion of the survey was voluntary, with prize incentives provided to randomly selected participants. This included a total of 538 potential respondents, as shown in Table 3.1.

Table 3.1 Potential Questionnaire Respondents

Total Possible $N = 538$

District	Total *N*	Certificated *N*	Classified *N*
BSSD	387	208	179
LPSD	74	57	17
KSD	77	43	34
Totals	538	308	230

The total number of useable responses was 212, including 125 from Bering Strait School District, 49 from Kuspuk School District, and 38 from Lake and Peninsula School District. The participation rate was much higher for certificated staff (54%) than for classified staff (13%), who were less likely to access their district e-mail accounts on a regular basis. The total response rate for the survey was 33%. Questionnaire response information is shown in Table 3.2.

Table 3.2 Certificated and Classified Response Data for Questionnaire

	Certified			Classified		
District	Possible *N*	Actual *N*	Response percentage	Possible *N*	Actual *N*	Response percentage
BSSD	203	103	50%	265	22	8%
LPSD	61	30	49%	15	8	53%
KSD	46	35	76%	48	14	29%
Total	310	168	54%	328	44	13%

In addition to questionnaire data, we conducted 14 interviews concurrently. The number of interview participants and their viewpoint or structural pose (Porter, 1990) are shown in Table 3.3. The total comes to 16 because one participant was both a school board member and elder and another was both a classified staff person and village elder. Half of the interview participants were also questionnaire respondents through their position as a school staff member. All of the interview participants were from either Lake and Peninsula School District or Bering Strait School District; Kuspuk School District declined to participate in the interviews.

Table 3.3 Summary of Interview Participants

Participant Description	*N*
Teacher	4
Community member (non-parent)	2
Administrator	3
Board member	2
Elder	3
Classified staff	1
Parent	1

3.4 Questionnaire Development and Administration

3.4.1 Questionnaire Development

Gall et al. (2007) made a distinction between the terms *survey* and *questionnaire*. Using their definition, *survey* is the more general label to describe research that is mixed method, using both a questionnaire and interviews to gather data. The questionnaire, then, is the quantitative data-gathering tool. The development of the questionnaire for this research had three stages. In the first stage we studied 18

questionnaires for measuring school improvement and education reform. This review included 6 questionnaires from the North Central Regional Educational Laboratory (2005), 2 from the National Center for Education Statistics (2004), 4 that were written for the ReInventing Schools Coalition and designed to measure implementation of the four components of the QSM (Cope & Crumley, 2003), 2 from the Learning Center (2002), and 1 each from the Southern Minnesota Initiative Foundation (2003), the National Education Association (2004), the National Institute of Standards and Technology (2005), and DuFour, DuFour, Eaker, and Many (2006). Following this review of existing questionnaires, we wrote 148 statements that were each tied to one of the four QSM components. A questionnaire was then designed from these statements with a plan to establish the alignment of each statement with one of the seven Baldrige in Education Criteria.

Next, we piloted the initial survey by asking a group of respondents to complete a categorical analysis of the items. The participants were 22 teachers and administrators who worked in districts using the QSM and who were attending QSM training. The categorical analysis consisted of coding each of the 148 statements to one of the seven Baldrige categories that the respondent thought the statement most closely aligned with. Unfortunately, the analysis from the activity showed little consistency in the coding by respondents. After further study of the questionnaire items, we concluded that the questions asked about the implementation of very specific elements or processes related to the QSM of education reform and that the language used in the questions was not general enough to obtain the desired alignment

with Baldrige in Education Criteria. We also determined that the respondent group as a whole did not have sufficient familiarity with the Baldrige Criteria to respond to the statements in a consistent manner, as there was no control placed on their level of experience with either the QSM or Baldrige.

We then searched for questionnaire tools written to measure education reform using Baldrige in Education Criteria, with the premise that the Baldrige criteria would be useable to measure any reform effort, including the implementation of the QSM in Lake and Peninsula, Kuspuk, and Bering Strait School Districts. In addition, another QSM school district (Chugach School District) had already demonstrated the use of Baldrige criteria to measure its implementation of the QSM. Two existing questionnaires (Dale, 2003; L. J. Miller, 1996) designed to measure the Baldrige in Education Criteria with highly correlated items were identified, and permission for their use was obtained by our cohort.

The first of the Baldrige-related questionnaires, The School District Quality Profile, was designed for school districts to self-assess quality practices derived from the Malcolm Baldrige National Quality Award Criteria (L. J. Miller, 1996). The purpose of L. J. Miller's research was to create an instrument that could provide a baseline measurement for school improvement. The instrument she created included 50 statements with a 6-point Likert scale. Content validity of L. J. Miller's School District Quality Profile was determined from four sources of data: responses from expert reviewers, input from graduate students, responses from questionnaire respondents, and results from the administration of the questionnaire. Cronbach's

alpha was used to analyze reliability by category, subcategory, and statement. Five of the seven Baldrige categories had acceptable alpha correlations (.7 or higher). Of the 16 subcategories that contained two or more items, two of them had unacceptable coefficients (less than .5) and four subcategories that contained only two items had coefficients that indicated a need for improvement (less than .6). L. J. Miller recommended a further refinement of the questionnaire in order to establish clear and concise content, to reduce educational jargon, and to ensure that each subcategory contained at least two statements, as well as review of items in the categories of Leadership and Strategic and Operational Planning that had coefficients of less than .7.

The second questionnaire had two response scales, similar to what we envisioned for measuring implementation of the QSM. That questionnaire was designed to assess perceptions of school staff concerning the importance and existence of the Baldrige criteria (Dale, 2003). Subjects for her study included the 378 administrators and staff of seven probationary Tennessee schools prior to the schools' involvement in a Baldrige Education Pilot program. The questionnaire contained 70 statements to which participants indicated the degree to which they considered that statement to be important, as well as the degree to which that concept was in existence in their schools. The same 5-point Likert scale was used for both the "importance" and "existence" responses. Content validity for Dale's questionnaire was established based on feedback from expert reviewers who identified the Baldrige category to which each statement related. Two internal consistency estimates of reliability were

computed for the perception and existence scales. The Spearman-Brown corrected correlation had a value of .9191, and the coefficient alpha had a value of .93, both indicating sufficient reliability.

In developing the questionnaire for this study, we coded each of the 120 items from the Dale (2003) and L. J. Miller (1996) questionnaires to one of the seven Baldrige categories and 28 subcategories. Although these statements had been previously coded in the L. J. Miller questionnaire, we decided that changes over the last 10 years in the Baldrige criteria and content of the categories necessitated a thorough recoding using a more current version of the criteria. For the purpose of this questionnaire and research, the 2006 Baldrige criteria were adopted as the standard. During the coding, items for which there was not agreement among the cohort members were discussed in order to clarify the category and subcategory to which they most closely related. With the objective of balancing the number of items relating to each Baldrige subcategory, each of us focused on at least one category in depth in order to eliminate items from overrepresented subcategories and to write new items for underrepresented subcategories. We used the following "Guidelines for Designing a Questionnaire" (Gall et al., 2007, p. 233) to analyze existing items and to write new items:

1. Do not use technical terms, jargon, or complex terms that respondents may not understand.
2. Avoid terms like *several, most,* and *usually*, which have no precise meaning.

3. State each item in as brief a form as possible.
4. Avoid negatively stated items, which are likely to be misread by respondents.
5. Avoid "double-barreled" items that require the subject to respond to two separate ideas with a single answer.
6. Avoid biased or leading questions.

Following this initial review and reduction, we collaboratively worked on all 7 categories in order to reduce the number of items per Baldrige category to no more than 15. Items containing technical terms or more than one key concept were revised further. The result was an initial questionnaire with a total of 84 items.

Two Likert-type scales were developed in order to assess participants' beliefs about the importance of Baldrige concepts and the degree to which they saw the concept in practice in their schools or districts, similar to what Dale (2003) used. Szulanski's research on transfer of business practices and knowledge provided some basis for our decision to use both belief and practice response scales (2003). He concluded that there could be large gaps between beliefs or expected use of a practice and what actually transferred or occurred. He stated that "routinized use of causally ambiguous knowledge was often accompanied by gaps between [expected] and actual patterns of use" (p. 26). Further, he found that where there was no causal ambiguity (meaning there was a complete understanding by the source of what was to be copied or replicated), the ideal description of the practice corresponded closely to actual practice or reality. But when the functioning of the exemplar being replicated or

transferred wasn't well understood, causal ambiguity existed; the higher the causal ambiguity, the greater the gap between the description of the ideal and reality. Successful transfer of a practice hinged on accurately communicating relevant information that allowed recipients to reconstruct every important detail of the necessary activities. Because it is possible that causal ambiguity may exist regarding the transfer of the QSM, resulting in transfer stickiness, we decided to include both a belief and practice scale for each item of the questionnaire. This decision was further supported by Cho et al. (2005), who wrote that both organizations and individuals socially construct their own realities, which then constrain their actions. They said that people whose decisions determine the implementation of policies do not respond to the "objective" facts of the situation, but rather to their image of the situation. "It is what we think the world is like, not what it is really like, that determines our behavior" (Cho et al., p. 40). The "belief" response scale for this questionnaire included *strongly disagree*, *disagree*, *agree*, and *strongly agree*. The "practice" response scale included *never*, *occasionally*, *frequently*, and *always*.

We chose a 4-point Likert scale for our questionnaire, without a neutral response option. According to Zhao (2003), a neutral response may discourage cognition where it is possible to select a neutral or no-opinion option. The need for a neutral response differs depending on whether questions are factual or attitudinal. Respondents may choose a neutral response on an attitudinal survey if it is available because they have not thought about their opinion. Without a neutral choice, respondents must become engaged to select a positive or negative response to

correspond with their opinion. A neutral or "don't know" response is more clearly needed when questions are factual and respondents might legitimately not know the answer (Walonick, 2004). Nowlis, Kahn, and Dhar (2002) found in controlled experiments with undergraduate university students that the possibility of response bias resulting from the lack of a neutral response could be controlled if respondents were able to opt out of individual questions or the whole survey at any point. In a Web-based questionnaire delivery mode, respondents could opt out at any point by simply closing their Internet browser to cancel their responses.

Once the questionnaire was completed, we calculated the readability using the algorithm for the Flesch-Kincaid grade level. Readability tests rely on number of words per sentence and number of syllables per word and are unable to measure factors related to text layout and design or the background knowledge of the individuals who approach the task of reading the text. Nonetheless, readability scores do provide some prediction of the reading ease for a document. The Flesch-Kincaid score is a measure of the level of education required to understand the content of a document. The Flesch-Kincaid readability grade for the questionnaire was 10th grade, with 34 out of 98 sentences containing 12 or fewer words and 9 sentences with more than 27 words. The readability for the companion Informed Consent was Grade 8.6, with 13 out of 34 sentences shorter than 12 words and 3 long sentences containing more than 27 words. The readability of the survey directions was 9th grade, with this section composed of 11 sentences. We concluded that the 10^{th} grade readability level was acceptable for the target audience for our questionnaire.

3.4.2 Expert Review of the Questionnaire

We asked four Baldrige-trained Examiners to serve as expert reviewers in order to establish content-related validity for the questionnaire. Baldrige Examiners serve as reviewers of organizations that have applied for the Baldrige National Quality Award. Examiners participate in a 4-day training session that prepares them to review, write an analysis of, and score written applications for the Award. Additionally, they complete a 30–40 hour case study evaluation prior to attending the training. The role of the expert reviewers is described by Gall, et al. (2007),

> Content-related evidence typically is determined systematically by content experts, who define in precise terms, the universe of specific content that the test is assumed to represent, and then determine how well that content universe is sampled by the test items. (p. 196)

The expert reviewers assessed each questionnaire statement by looking at its alignment to the Baldrige category and subcategory to which it was assigned. The reviewers also provided written feedback on those items that did not align to the Baldrige category or subcategory. Questionnaire items were then deleted, revised, or added in response to this analysis from the expert reviewers and results of the field pretest with Chugach School District staff.

3.4.3 A Comparison of Web-Based and Paper Questionnaires

We decided to electronically administer the questionnaire through the Internet after carefully considering the pros and cons of this form of questionnaire delivery and response collection. While some research shows that Web-based surveys often have a

lower return rate than mail surveys (Solomon, 2001; Tomsic, Hendel, & Matross, 2000), other research (Kiernan, 2005) indicates that the Web-based method is superior to the paper and pencil approach for ease of use and generating a better response rate. Yun, Yun, and Trumbo (2000) found, when examining data from a survey administered to members of a professional association using three modes of delivery (postal mail, e-mail, and Web-based delivery), that the Web-based delivery did not bias results. Cheskis-Gold, Loescher, Shepard-Rabadam, and Carrol (2004) provided a concise summary of the pros and cons of using Web-based technology to administer a questionnaire that was useful in our decision making, shown in Table 3.4.

Table 3.4 Advantages and Disadvantages of Web-Based Surveys (Cheskis-Gold et al., 2004)

Advantages	Disadvantages
Savings in printing, postage, data entry.	Need programming and IT expertise.
No data entry errors from hand-entry. (However, poor programming could lead to lost data.)	Certain populations are not comfortable with using personal computers.
Shortened timeframe to administer surveys (3 weeks with Web surveys vs. 6 weeks or more with paper surveys).	Must have accurate e-mail lists.
Easier and cleaner to provide skip patterns or survey sections customized to different respondent populations.	Web surveys are not recommended for e-mail software that doesn't support Web access. Must be able to click on a .url provided in an e-mail and to have it bring respondent to a Web page.
Almost immediate access to data for analysis.	There may be problems finding software that is appropriate for both PCs and Macs, or developing surveys that run on both platforms.
Can easily link to background data, if appropriate (e.g., gender, yrs. of service, etc.).	Data provided via a Web survey are not *anonymous*, although the survey administrators may choose to keep the results *confidential.*

After considering that respondents were very geographically dispersed and had school access to technology, we determined that the targeted population of school district employees' regular use of e-mail and the Internet would overcome limitations such as a lack of familiarity with the media that were cited in the research that found that a mail survey led to a higher level of return. A second consideration in this decision was the expediency of the electronic format. The remote location of many of the schools (e.g., Little Diomede) would likely have caused delays and lapses in traditional mail communication. Finally, we felt that the motivation to complete the questionnaire would be greater with a Web-based approach because we offered incentives of gift cards to randomly selected completers. A Web format could generate quick gratification for respondents when they learned they would receive a gift card. We hoped this would then encourage others at the same work site to complete the questionnaire. As Cheskis-Gold et al. (2004) noted, the development of a Web-based questionnaire requires some specialized skills in technology. Along with another member of the cohort, I had some previous Web-based survey technology experience (Cope & Crumley, 2003), which was another consideration that made a Web-based questionnaire possible for our cohort.

One primary goal of a Web-based questionnaire was to get respondents to answer all the questions as accurately as possible. Our focus was on making the questionnaire-taking process as streamlined and easy to complete as possible with minimal distractions in the design of the online questionnaire pages. Several researchers and technology experts provided guidance related to the design of Web-

based surveys (Archer, 2003; Crawford, McCabe, & Pope, 2005; Gales, 2000). Crawford et al. (p. 47) said, "Screen design is arguably where the most deviation from known data collection methodologies exists" and used that premise to create standards for four categories related to Web-based surveys: screen design, questionnaire writing, respondent communications, and processes. Tufte (2001) advocated design that is free from clutter that distracts readers from the central message. He suggested using a muted background for the page or pages to allow for good contrast between the text and the background, sparing use of bright colors, and use of the same color for all items that belong to the same category.

In their proposed standards for the design of Web surveys, Crawford et al. (2005) recommended that any logo and contact information be placed in an out-of-the-way location on each screen. Contact information should be there in case it is needed by respondents, but in a manner that allows most people to develop "banner-blindness" and ignore it. A line or change of color should set the questions apart from the rest of the viewing screen. The screen should also contain a progress bar or page number (e.g., "page 1 of 6") that tells respondents how far they have progressed through the questionnaire. Crawford et al. also recommended organizing a long questionnaire as pages, avoiding the need to scroll down through a long list of questions on one page. They recommended the use of black font color for text and advised that error messages, if used, should give very specific information about the error. For this survey, where required-response was used, respondents received a very specific error message if they had not answered all the items on a page when they tried

to proceed to the next page. The message said, "Please select a response for question #__." Crawford et al. also made recommendations for a maximum of 12 grid columns, including a column for the questions. All response columns should be evenly spaced so no response choice receives more or less attention than the others. Norman (n.d.) advised that Web-based surveys should always be password protected to restrict access by unauthorized respondents. We used the standards, recommendations, and Web design principles noted here in the design of the QSM questionnaire for this study.

3.4.4 Field Pretest

In order to establish internal reliability, we conducted a field pretest of the questionnaire per the suggestion found in McMillan & Schumacher (2001). A representative sample of 20 administrators, teachers, and staff from Chugach School District, the rural Alaskan school district where the QSM was first designed and implemented, participated in the field pretest. The district superintendent at the time of the study was one of the cohort members. To establish internal instrument reliability, we calculated a value for Cronbach's alpha for questionnaire items initially placed in each of the seven Baldrige categories. For the final instrument, we retained 72 items that allowed for sufficient reliability. Reliability scores for each category and for the belief and practice scales for 84 and 72 items are shown in Table 3.5.

Table 3.5 Pilot Questionnaire Reliability with 84 and 72 Items, N = 20

Questionnaire category	Alpha before cut (84 items)— Belief scale	Alpha after cut (72 items)— Belief scale	Alpha before cut (84 items) — Practice scale	Alpha after cut (72 items)— Practice scale
Leadership	0.94	0.93	0.84	0.88
Knowledge Management	0.90	0.90	0.82	0.82
Process Management	0.91	0.91	0.85	0.86
Results	0.90	0.90	0.72	0.73
Staff Focus	0.89	0.88	0.80	0.80
Student/Stakeholder/ Market Focus	0.90	0.90	0.77	0.77
Strategic Planning	0.88	0.87	0.72	0.72

3.4.5 Questionnaire Administration

We made telephone contact with each school site's principal 2 weeks prior to administration of the questionnaire in order to solicit his or her support. At the same time, we sent an e-mail to all potential participants to introducing ourselves as researchers, provide an overview of the study, and explain the incentive for completing the questionnaire. We sent a second e-mail a few days later to each potential participant containing an explanatory cover letter and informed consent, request for completion, and link to the URL for the questionnaire. Potential participants were asked to complete the questionnaire within one week of receiving

the e-mail. Follow up e-mails were sent weekly by the cohort to individuals on the district electronic mailing lists who had not yet completed the survey between April 16 and May 16, 2007.

The questionnaire was administered electronically via a secure third-party Web site. A database was linked to the survey to capture participant responses while they completed the questionnaire. At the completion of the survey, participants were invited to submit their name, separate from the survey, for random drawings for prizes and for a grand prize drawing of airline miles. The names and identifying information contained in the incentive entries were removed from the data by the third party Web site administrator before they were returned to us.

3.5 Analysis of Quantitative Data

3.5.1 Definitions for Factors and Knowledge Subscales

I used the following conceptual definitions for factors identified in the structural model for this research and to describe the Knowledge Management subscales:

Leadership

The Leadership factor as defined in this study included stability and consistency, a strong focus on ethical behavior, and "personal involvement in creating and sustaining a customer focus, clear values and expectations, and a leadership system that promotes performance excellence" (NIST, 2006, p. 39).

Strategic Planning

The Strategic Planning factor as used in this study meant that there is a written shared vision in place and that there was staff and stakeholder involvement in the process of developing both the strategic plan and action plans to carry out the strategy. Contained within the strategic plan was a focus on improvement of student learning. This factor stressed "learning centered education and long-term organizational sustainability" (NIST, 2006, p. 40).

Measurement, Analysis, and Knowledge Management

The Knowledge Management factor is the center for "all key information about effectively measuring, analyzing, and reviewing performance and managing organizational knowledge to drive improvement in student and operational performance," (NIST, 2006, p. 43). NIST stated that *alignment* and *integration* are key terms for knowledge management, and defined them by saying, "Alignment and integration include how measures are aligned throughout the organization and how they are integrated to yield organization-wide data and information" (p. 44). In this study, 12 questions aligned with four knowledge-related subscales:

> *Knowledge creation and gathering*—This subscale included questionnaire items 7, 11, 13, 28, and 52 and included the collection and selection of data and information from within and outside the organization as well as ongoing evaluation of the types of information and knowledge the organization seeks and creates in order to make sure it is aligned with changing needs. This subscale included use of comparative data (benchmarking) to determine where

the organization stands relative to others and to best practices. It is aligned with Baldrige in Education Criterion 4.1.a (NIST, 2006, p. 23).

Knowledge analysis and use—This subscale included questionnaire items 22, 24, 25, and 59 and is aligned with Baldrige in Education Criterion 4.1.b (NIST, 2006, p. 23). It included the analysis and use of knowledge resources in a manner that is consistent with organizational needs and decision making based on relevant data and information. NIST (2006) emphasized the importance of this subscale by saying,

> Action depends on understanding cause–effect connections among processes and between processes and results or outcomes. Programmatic and operational changes may have many resource implications. Organizations have a critical need to provide an effective analytical basis for decisions because resources for improvement are limited and cause–effect connections often are unclear. (p. 45)

Knowledge availability—This subscale included questionnaire items 20, 27, 29, and 71. It included statements that assess the degree to which individuals have the information and knowledge necessary to do their work. It also included communication between students and the school as well as between the school and other stakeholders. Availability and use of technology to facilitate knowledge transfer were included in this subscale. This item correlates with Baldrige in Education Criterion 4.2.a (NIST, 2006, p. 24).

Organizational knowledge use—This subscale included questionnaire items 17, 40, 44, and 57. It included collection and transfer of faculty and staff knowledge and "the rapid identification, sharing, and implementation of best practices" among staff (NIST, 2006, p. 24). This subscale is aligned with Baldrige in Education Criterion 4.2.b (p. 24).

Faculty and Staff Focus

This factor includes training for district staff in continuous improvement processes. It also includes encouragement for involvement in district decision making and the evaluation of the effectiveness of staff development initiatives. This factor stressed the organizational work climate and support for faculty and staff well being, satisfaction, and motivation.

Process Management

As used in this study, Process Management includes the analysis of student learning and the creation of processes to improve learning. It includes the organizational ability and willingness to change or adapt programs to improve student learning, and review and improvement of organizational processes and functions. Key words for this factor are *efficiency* and *effectiveness*. Process Management is both student-related and operational.

Student, Stakeholder, and Market Focus

This factor was defined as including the organization's ability to listen and learn about student and stakeholder needs and expectations, including the ease of access to schools and district for parents and stakeholders to provide input. It included

the building of relationships with other student service providers, including colleges and universities, and the initiation of communication with parents and stakeholders to gather satisfaction information.

Results

The Results factor as used in this study was primarily linked to organizational results such as student and stakeholder satisfaction, measures of productivity and operational effectiveness, and results of improvement efforts.

3.5.2 Handling of Missing Data

There were 249 participants who started the Web-based questionnaire. Thirty-three of those stopped at some point and didn't finish. By checking the identifying computer number and clock time, we could see that most of the individuals who stopped taking the questionnaire started anew at a later time and completed it. We removed the 33 incomplete cases from the data file; four additional cases had one missing question response, and those cases were also removed from the data file, leaving 212 cases for analysis.

3.5.3 Software Programs for Statistical Calculations

I used SPSS 15.0 to compute demographics, to test assumptions, and for principal components factor analysis. I also used it to compute reliability scores and for one-way analysis of variance tests (ANOVA) for Research Questions 1 and 2. SPSS was also used for mixed between-within subjects analysis of variance for Research Question 3. I used AMOS 7.0 for confirmatory factor analysis (CFA) to

create Knowledge Management subscales and to create a structural model from the data for Research Question 4.

3.5.4 Reliability of Instrument

As a group, we calculated Cronbach's alpha to analyze reliability for each Baldrige category for the belief and practice scales. Each category had acceptable internal consistency ($\alpha > .80$) for practice scales, with slightly higher scores ($\alpha > .89$) for the belief scales. Some alternate groupings of items based on theory also produced high reliability likely due to the systemic, correlated nature of the Baldrige constructs themselves and the highly correlated nature of the Miller (1996) and Dale (2003) instruments we started with. A confirmatory factor analysis of the four Knowledge Management subscales produced quite acceptable R^2 values (between .889 and .998) as another statistical verification of the reliability of the Knowledge Management subscales to measure the intended constructs.

3.5.5 Selection of Knowledge Management Variables

There were 12 items from the QSM questionnaire that I accepted a priori as knowledge related based on earlier identification by our cohort. In addition, there were 17 questionnaire items that were rejected for use for research question 4, some because their regression and squared multiple correlation scores were low showing possible misidentification of category affinity. Because of the ubiquitous nature of knowledge and the fact that knowledge activity statements are embedded within all of the other Baldrige in Education categories as discussed in Chapter 2, I looked again at the items unused for research question 4 and unused by any of the other cohort

members. An examination of the content of the questionnaire items along with, a.) review of similar items on three knowledge management surveys (the Intra-Firm Transfer of Best Practice Survey by Szulanski [2003]; the Knowledge Management Assessment Tool [KMAT] designed by the APQC with Arthur Anderson, Inc. [O'Dell & Grayson, 1998]; and the Knowledge Management Practices Survey designed by Glickman [2005]), b.) the Baldrige in Education Criteria, and c.) knowledge management theory all suggested that six additional variables from the questionnaire (items 11, 13, 24, 17, 28, and 71) measured knowledge-related concepts.

I verified that the six additional items were more correctly knowledge variables using CFAs. First I loaded the items into their a priori category and noted the regression, standardized regression, and squared multiple correlation scores. Next, I loaded the items with the other knowledge variables and reran the CFAs. For all six variables and both belief and practice scales, the regression and R^2 values were higher when the variables were loaded with Knowledge Management, showing a better fit with that factor. I hypothesized that the 17 questionnaire variables suggested four knowledge subscales: Knowledge Creation and Gathering (5 variables); Knowledge Analysis and Use (4 variables); Knowledge Availability (4 variables); and Organizational Knowledge Use (4 variables). I used principal component and confirmatory factor analyses to verify the placement of the variables into these subscales.

The purpose of factor analysis is to reduce a number of variables into a smaller number of representative constructs, called factors. There are two kinds of factor

analysis used in difference instances to examine the interrelationships among variables: exploratory (or principal components) and confirmatory factor analysis. Exploratory factor analysis is a theory-generating procedure while confirmatory factor analysis is a theory-testing procedure. Stapleton (1997) said,

> Exploratory factor analysis is used to explore data to determine the number or the nature of factors that account for the covariation between variables when the researcher does not have, a priori, sufficient evidence to form a hypothesis about the number of factors underlying the data. (p. 1)

Principal component or exploratory factor analysis can be used, as in this case to determine the communality among variables. All of the Knowledge Management identified variables had sufficiently high communality and acceptable results from Barlett's Test of Sphericity to warrant factor analysis, though the PCA returned two factors, only one of which had an Eigen value over 1.0. Fifteen of the variables loaded on the first factor. Of this phenomenon, Mulaik (1987) said, "There is no rationally optimal way to extract knowledge from experience without making certain prior assumptions" (p. 265). Further, Stapleton (1997) said, "Exploratory assumptions may not always honor the relationships among the variables in a given data set" (p. 2). Mulaik (1987) concluded that the experience of a researcher with a phenomenon was a better way to extract potential factors from a data set.

After using PCA followed by CFA to determine that the knowledge items were sufficiently correlated, I used confirmatory factor analysis to test a four factor model for knowledge management. I assumed that all four factors were correlated to some

degree, without fixing or predetermining the degree of correlation. I used goodness of fit statistics to determine that all of the variables measured the hypothesized factors very well. In addition to examining the goodness of fit statistics generated by AMOS during the CFA, I calculated Cronbach's alpha for the set of 17 questionnaire items retained to measure Knowledge Management. Cronbach's alpha was .934 for the belief scale and .928 for the practice scale. All four of the sub factor alphas were also acceptable, ranging from .723 to .822. Variables assigned to the four knowledge subscales and supported by the CFA are shown in Table 3.6.

Table 3.6 Knowledge Management Variables Assigned to Subscales

Factor 1: Knowledge Creation and Gathering
7. We revise and change the type of performance data we collect as our needs and direction change.
11. Our schools continually evaluate how we determine the educational needs of our students.
13. Our schools have data that enables us to monitor trends in the levels of student/family satisfaction over the past three years.
28. I know how well our students are performing compared to similar schools.
52. The quality data our district gathers cover a broad scope and come from a variety of sources.
Factor 2: Knowledge Analysis and Use
22. Our district's performance is analyzed, and the data are used in the strategic plan to improve our district.
24. Our school district's strategic plan is based on an analysis of a variety of data.
25. Performance review results are analyzed and used to improve district leadership and staff performance.
59. Our district uses comparisons with similar school districts to guide the improvement of quality and to improve instructional services.
Factor 3: Knowledge Availability
20. District and school staff can quickly get information they need to make improvements in their work.
27. Our district ensures that software and hardware systems (computers, Internet, and networks) are current with our district's needs.
29. Our district provides a computerized data management system for staff to utilize.
71. When our schools review our student/family satisfaction results, they are able to break the data into appropriate groups.
Factor 4: Organizational Knowledge Use
17. Our district measures staff learning and development in areas such as collaboration and knowledge/skills sharing.
40. The district has effective ways to communicate important information to students.
44. Information about best practices is collected and shared among staff members.
57. The student/family data we collect are translated into solutions to student/family problems.

3.5.6 Tests of Assumptions

The decision to use factor analysis, *t*-tests, ANOVA or MANOVA, and SEM depends on whether a set of data satisfies a number of assumptions. The first assumption is sample size. For regression statistics, Tabachnick and Fidell (2007, p. 123) recommended $N > 50 + 8m$ (where m = number of independent variables) for testing multiple correlations and $N \geq 104 + m$ for individual predictors, assuming a medium-sized relationship between the independent variables and dependent variables. Research Questions 1, 2, and 3 considered three IVs at once with a total of nine predictors, so, using this formula, 112 cases were needed for multiple correlations and 113 cases were needed for individual predictors. With $N = 212$, the assumption of sample size adequacy was met for testing regressions.

Tabachnick and Fidell (2007, p. 613) stated that for estimating correlation coefficients, 200 cases was considered fair and 300 cases was considered good. They also said that solutions with several high-loading marker variables (> .80) do not require such large sample sizes, and in that case, analysis could be done with as few as 150 cases. Sampling adequacy for factor analysis is often done using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy. "Kaiser's measure of sampling adequacy is a ratio of the sum of squared correlations to the sum of squared correlations plus sum of squared partial correlations" (Tabachnick & Fidel, p. 614). Values of .6 and above are required for a good factor analysis. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy Results for the Knowledge Management set were .938 for the belief items and .942 for the practice scale. For SEM, which uses

parameter estimates and chi-square tests of fit that are sensitive to sample size, 10 cases for every variable estimated is the rule of thumb, with the goal of achieving a $\chi 2/df$ value < 2.00.

The second assumption test relates to the distribution of scores in a sample. When the distribution of scores is absolutely normal, which is often not the case in social research, the scores for skewness and kurtosis will be zero. Skewness has to do with the symmetry of the distribution; a skewed variable is one whose mean is not in the center of the distribution. Kurtosis has to do with the peakedness or flatness of the distribution. A variable can have significant skewness, kurtosis, or both (Tabachnick & Fidell, 2007, p. 79). A value of 3 or more on the kurtosis test indicates a large departure from normality (with α of .01 used for significance). All of the knowledge variables met tests for skewness and kurtosis at acceptable values.

Another assumptions test related to the distribution of the data is for outliers. Outliers are cases with values well above or below the others. Outliers have more influence on a factor solution than other cases. To examine for outliers for the 17 belief and 17 practice knowledge variables, I examined the box plots for each variable. There were some cases of outliers in the variables, so then the 5% trimmed mean values were examined; in each case, the trimmed mean was very similar to the mean value. Given this and the four-response design of the questionnaire, I decided to retain all cases. This same process was used to examine the rest of the variables prior to starting the CFA/SEM procedures for Research Question 4.

Another assumptions test was for multicollinearity among variables and between the Knowledge Management sub factors. Multicollinearity can result when there are very high squared multiple correlations—above .90. It means there may be redundancy in constructs measured by the variables. Researchers are advised to remove variables causing multicollinearity unless the goal of the research includes analysis of structure such as factor analysis, principal components analysis (PCA), and SEM (Tabachnick & Fidell, 2007, p. 89). Initially, I considered MANOVA for the statistical analysis related to Research Questions 1 through 3, but MANOVA works best with moderately correlated dependent variables. The R^2 values for the individual Knowledge Management subscales ranged from .889 to .998, making MANOVA an unsatisfactory choice since I planned to use the factor scores rather than individual variables. I decided to use ANOVA instead for Research Questions 1 through 3.

Research Question 4 called for CFA and SEM statistical analyses where in addition to univariate normality, multivariate normality is assumed. Bryant and Yarnold (1995) said,

> This means that besides assuming each observed indicator is normally distributed, all linear combinations of these indicators are also assumed to be normally distributed. Violations of multivariate normality can distort goodness-of-fit indexes and invalidate the conclusions drawn from statistical tests. (p. 116)

Mahalanobis distance is one test that can be used to check for multivariate normality where χ^2 for each variable to be included is compared against a table of critical values.

The Mahalanobis test was run in AMOS for the full set of 72 variables and for the Knowledge Management subscales and variables. All of the items from the QSM Questionnaire had acceptable χ^2 values when checked for multivariate normality, so this assumption was also met.

3.5.7 Analysis for Research Questions 1 and 2

Research Question 1 focused on participants' belief about the importance of knowledge-related concepts that are part of the QSM. Research Question 2 was designed to probe participants' perceptions about the degree to which those same concepts had been operationalized in their district. These two research questions were answered using the four Knowledge Management subscales created from 17 questionnaire variables, as described earlier.

Because the hypotheses for these research questions utilized the demographic data of respondents as independent variables, I identified groups from the demographic data. For the independent variable of job classification, subgroups were administrators, teachers, and classified staff. Both of the variables of total education work experience and work experience in a QSM district were grouped as 0–3 years, 4–10 years, and 11 or more years. The teacher participant group was divided into a second level of analysis using years of education experience. The largest response group was teachers, shown in Table 3.7.

Table 3.7 Summary of Participants by Job Classification

Job classification	Count
Administrator	36
Teacher	132
Classified staff	44

When broken down by years of education experience, shown in Table 3.8, the group of respondents with 11 or more years of experience is twice as large as the group with 0–3 years of experience, and when separated into years of experience in a QSM district, the numbers are reversed.

Table 3.8 Summary of Participants by Years of Education Experience and Years of QSM District Experience

Category	Years of education experience	Years of QSM experience
0–3 years	44	101
4–10 years	67	71
11 years or more	101	40

Table 3.9 shows the teacher participant group first by years of education experience and then by years of experience in the QSM district. The teacher group was fairly evenly split by years of overall education experience, but with far more teachers having fewer rather than more years of experience with the QSM.

Table 3.9 Summary of Teacher Participants' Years of Experience

Category	Years of education experience	Years of QSM experience
0–3 years	32	71
4–10 years	49	47
11 years or more	51	14

Descriptive statistics including count and percent of each response choice were calculated for each variable on the belief and on the practice scales. Means and standard deviations were also calculated. I tested all of the Question 1 and 2 hypotheses using one-way analysis of variance (ANOVA) where the independent variable was job classification, years of experience, or years of experience in the QSM district and the dependent variable was a knowledge factor from the belief or practice scale. ANOVA was the appropriate statistic because there were three levels for the independent variable as opposed to t-tests which are used when there are two different groups to compare or MANOVA which should be used when there is more than one dependent variable considered at a time. ANOVA compares the variance between different groups (i.e., administrators, teachers, and classified staff), which is due to the independent variable, with the variability within each of the groups, which is believed to be due to chance (Pallant, 2007). The analysis produces an *F* ratio, which represents the variance between the groups divided by the variance within the groups. A large *F* ratio indicates that there is more variability between groups, but post-hoc tests need to be used to determine exactly which groups vary significantly. For this study, I used

Tukey's Honestly Significant Difference Test (HSD) for post-hoc comparisons of differences. Eta squared was calculated to determine effect size of the findings, which is a description of the degree to which the two variables are associated with one another and an indication of the importance of findings.

3.5.8 Analysis for Research Question 3

Research Question 3 asked if there were significant differences between belief and practice scores. To answer this question for the individual districts in the study, I used paired samples t-tests because no comparison of the districts was planned for this research. For the rest of the Research Question 3 analysis, I used mixed between-within ANOVA procedures which allow a researcher to combine the comparison of two or more groups (i.e. administrators, teachers, and classified staff) and another independent variable within each of the groups (i.e. Knowledge Creation Beliefs and Knowledge Creation Practice). A mixed between-within ANOVA requires at least three variables. Table 3.10 summarizes the variables used for Research Question 3 ANOVAs.

Table 3.10 Matrix of Independent /Dependent Variables for Research Question 3

Variable Type	Variable Name
Categorical Independent Between Subjects Variable	Job Classification Years of Experience Years of Experience in Current QSM District
Categorical Independent Within Subjects Variable	Knowledge Creation Belief & Practice Knowledge Use Belief & Practice Knowledge Availability Belief & Practice Organizational Knowledge Use Belief & Practice
Continuous Dependent Variable	Difference between Belief & Practice Scores

The mixed between-within ANOVA procedure tests whether there are main effects for each of the independent variables. In this case, the procedure showed whether there was a difference in the belief/practice difference scores between groups (main effect for the between subjects variable) and also provided a comparison of the difference scores for each of the knowledge subscales (the main effect for the within subjects variable). Last, the mixed between-within ANOVA showed whether the mean Belief/Practice scale differences varied significantly by knowledge factor between groups (the interaction effect).

The mixed between-within ANOVA statistic has an additional assumption of homogeneity of inter-correlations that should be checked when the group sizes are unequal, to ensure the robustness of this type of ANOVA (Tabachnick & Fidell,

2007). For each level of the between subjects variable (i.e. Job Class – administrator, teacher, classified) the pattern of inter-correlations between the knowledge subscales should be the same. One way to check this is to run correlation matrices for each group showing all knowledge subscales (15 correlation tests) and compare the results. The comparison of results should show that the cells with the larger samples (i.e. all of the knowledge subscales for teachers in the job class group) produce larger variances and covariances, in order to have confidence in the results of the mixed between-within ANOVA (Tabachnick & Fidell, 2007, p. 252). Fortunately this assumption is tested in SPSS as part of the analysis, using Box's M statistic and should be checked first for a non-significant value before proceeding with the rest of the analysis. For all of the analyses for Research Question 3, the Box's M value was non-significant so mixed between-within ANOVAs were appropriate for the data.

3.5.9 Analysis for Research Question 4

Research Question 4 focused on assessing the relationships among the organizational quality dimensions as proposed by the Baldrige Education Criteria for Performance Excellence framework using the variables from the practice scale of the questionnaire. This research question was of interest to all four of us in the research cohort to help explain our individual results within a systems context; therefore the hypothesis in my study related to the interaction of Knowledge Management with the other factors. We used structural equation modeling to examine the Baldrige framework as a whole to determine if the causal relationships implied by the model structure fit the actual relationships within our data set. The theory behind these

relationships was detailed in Chapter 2, along with a number of studies that used SEM to apply the theoretical framework to a specific set of data and conditions, usually with results different from the theory.

Structural equation modeling (SEM) combines confirmatory factor analysis (CFA) as the measurement model to test the reliability of the observed variables with a structural model to display the interrelationships among latent constructs and observable variables. CFA has three main purposes: construct validity evaluation, response pattern comparison, and competing model comparison (Sun, 2005). The purpose and value of SEM is to test a theory about potential relationships among variables, in this case among the 7 Baldrige factors. Tabachnick and Fidell (2007), in describing the value of SEM, said, "When the phenomena of interest are complex and multidimensional, SEM is the only analysis that allows complete and simultaneous tests of all the relationships" (p. 679). In stating their preference for SEM over path analysis, J. Schreiber, Stage, King, Nora, and Barlow (2006) pointed to the assumptions for path analysis that are rarely met in education settings, including a premise that variables are all unidirectional, without feedback loops. J. Schreiber et al. pointed out that "almost all of the variables of interest in education research are not directly observable" and concluded that "the use of a single indicator to fully capture the complexities of [latent constructs such as test anxiety and self-reported behaviors] as required in path analysis is impractical" (p. 326).

In SEM, statistical terminology and graphical elements are used very specifically. For example, constructs that influence but are not influenced by other

constructs are exogenous (J. Schreiber et al., 2006). Endogenous variables are both influenced by and influence other constructs (J. Schreiber et al., 2006). Exogenous variables are similar to independent variables, and endogenous variables are similar to dependent variables. SEM determines whether constructs within a model are exogenous or endogenous. Observed variables are represented graphically with a square or rectangle. Latent factors—the unobserved variables—are depicted graphically with circles or ovals. In this study, the latent factors were the seven Baldrige in Education Criteria and the measured variables were the questionnaire items that reflected each of the constructs. Smaller circles are used to designate the measurement error in the variables. Arrows and lines in a CFA or SEM diagram achieve their meaning based on whether they are straight or curved and single or double ended. J. Schreiber et al. (2006) explained,

> The straight line pointing from a latent variable to the observed variables indicates the causal effect of the latent variable on the observed variables. The curved arrow between latent variables indicates that they are correlated. If the curve were changed to a straight one-headed arrow, a hypothesized direct relationship between the two latent variables would be indicated. (p. 323)

Structural modeling is very sensitive to missing data and also to sample size. While researchers differ regarding the number of cases (respondents) needed per variable (item), the "rule of 10" is often applied (Garson, n.d.), which advises that 10 cases are a minimum for each variable retained for structural modeling. Other

preparatory assumptions tests for normality, outliers, and multicollinearity were conducted, as discussed earlier.

Responses from the practice scale of the questionnaire were used for SEM because we concluded that they were more actionable and as such, representative of the Baldrige model. Prior to the CFA analysis and as a group, we examined all of the questionnaire data using theory, the expert reviews, and communalities from an initial principal components factor analysis to assign variables to the seven Baldrige constructs of Leadership; Strategic Planning; Process Management; Staff Focus; Knowledge Management; Student, Stakeholder, and Market Focus; and Results. In addition, using AMOS 7.0, I did a confirmatory factor analysis separately for each of the seven identified constructs using maximum likelihood estimation in order to confirm that variables reliably measured the factor. The CFAs for each of the seven Baldrige-related constructs are in Appendix F.

We examined the measurement variables for each of the seven latent variables, using the standardized regression weights and squared multiple correlations for individual variables to reduce the number of variables to 28 and retaining the four highest loading individual variables to measure each of the latent variables. Satisfactory goodness of fit was achieved with a path model, which allowed us to retain all seven of the latent constructs specified by the Baldrige theoretical model by freeing some parameters and using Leadership as the driver for the model. The statistically acceptable model was consistent with theory about leadership as a driver

for change. The QSM CFA path model included 28 observed and 41 unobserved variables, and 69 distinct parameters.

The goal of both CFA and SEM is to use as many of the identified measurable variables as possible to paradoxically achieve a parsimonious fit as measured by acceptable model index scores. That said, J. Schreiber et al. (2006) cautioned that many researchers become enamored with fit statistics and lose sight that both CFA and SEM should be guided by theory. Tanaka (1993) identified a classification schema for fit indices along six dichotomous dimensions: 1—population based or sample based; 2—simplicity versus complexity; 3—normed or non normed; 4—absolute versus relative; 5—estimation method free versus estimation method specific; and 6—sample size independent or sample size dependent. Dimensions 1, 2, and 4 are related to how fit indices are constructed, while dimensions 3, 5, and 6 relate to some of the characteristics of fit indices.

The fit statistics commonly used to determine the suitability of a CFA solution or structural model are $\chi^2/df \leq 2$ or 3; comparative fit index (CFI) or normed fit index (NFI) $\geq .95$; goodness-of-fit index (GFI) $\geq .95$; and root mean square error of approximation (RMSEA) $< .08$. The chi-square statistic is especially helpful for comparing different models as modifications are made. Both CFI and GFI are sample-based absolute fit indices, with GFI accommodating more complex models better than CFI, which almost always goes down as more parameters are freed. GFI is sometimes considered to be the normed chi-square statistic (Sun, 2005). RMSEA is a population-based absolute fit index based on the estimated difference between the reproduced

covariance matrix and the unknown population covariance matrix. Sun recommended RMSEA for construct validity evaluation. NFI was designed to be sensitive to sample size, guarding against an inflation effect for large samples and a bias effect for small samples.

We hypothesized that a structural model could be created using all of the variables and factors identified with the maximum-likelihood CFA and we did achieve an acceptable and plausible model with significant direct and indirect paths to all seven factors based on the CFA, without making post-hoc modifications. However, the Baldrige in Education theoretical model shows the construct of Measurement, Analysis, and Knowledge Management as the foundation of the model, with recursive arrows to all of the other factors. Our initial solution could not accommodate that many parameters due to our sample size. Further, previous researchers found that Knowledge Management was nearly as significant as Leadership as a driver of the model. The QSM structural model shows that Knowledge Management affects four of the five other endogenous factors and affects both of the outcome factors. Absent though in the Quality Schools model is either a direct or indirect path from Knowledge Management to Staff Focus.

3.6 Interviews

3.6.1 Purpose of the Interviews

Kushman and Barnhardt (1999) wrote that "community voice captures the essence of what we believe to be the important elements of a productive educational partnership between school and communities in remote Alaska villages" (p. 13).

Active solicitation and incorporation of community input is expected in many of the processes within the QSM. Likewise, the Baldrige criteria contain an expectation of community involvement for educational effectiveness. For this research, we conducted structured interviews with a cross-section of individuals from the three school districts to elicit the community perspective related to implementation of the QSM. We had two main objectives for the interviews: (a) to ascertain the degree to which the respondents considered the specific elements of education reform described within the Baldrige criteria to be important and in existence in their schools and (b) to do so in a manner that "elaborates, enhances, illustrates, or clarifies" (Greene et al., 1989, p. 257) the information obtained through the questionnaire.

3.6.2 Interview Participants

We used criterion sampling to select staff and community members from the communities serviced by each of the school districts. "Criterion sampling involves the selection of cases that satisfy an important criterion. This strategy is particularly useful in studying educational programs" according to Gall et al. (2007, p. 187). We requested assistance from the district superintendent and school principals in identifying potential interview participants who were likely to have knowledge of school programs and activities. We conducted a total of 14 interviews that included individuals serving in one or more of the following roles: community member, parent, elder, school board member, classified staff person, district office administrator, teacher, and principal. Table 3.11 provides demographic information for interview participants.

Table 3.11 Demographic Information for Interview Participants

Stakeholder group	Site	Years of Education Experience	Years of QSM Experience
Community member/retired teacher	A	23	6
Community member	B		6
School board president/Elder	C	28	8
Classified staff/Elder	C	30	8
Elder	D		6
Board member	C	20	6
Teacher	E	6	3
Teacher	F	6	6
Teacher	G	22	7
Teacher	D	2	2
Principal	A	15	7
Principal	H	7	25
District Administrator	I	19	6

Note: Letters in the second column correspond to the site represented by the participant.

3.6.3 Interview Questions

One of the purposes of the interview process was to bridge the more general education reform criteria of Baldrige in Education and the specific cultural focus that is a strength of the QSM of education reform. The second objective for the interview was to collect data that would complement the data collected through the questionnaire. Related to the design of the interview questions Gorden (1992) said,

> For a question to be useful, it must first be logically relevant to the objectives of the interview. However, for it to be relevant is not enough; the question must also be formulated to motivate the respondent to give complete and accurate answers. (p. 23)

As a reference in designing the interview questions, we used Patton's "Matrix of Question Options" (1987, p. 118), which outlines six types of questions. Behavior/experience questions address subjects' past, present, or future actions and result in responses in which subjects describe activities, decisions, or behaviors that would actually be observable. Opinion/belief questions are aimed at understanding how subjects cognitively structure their reality. They attempt to uncover a subject's worldview and frequently begin with "What is your opinion of ..." or "What do you think about ..." Frequently, these kinds of questions are confused with the next two types: feeling questions and knowledge questions. Feeling questions deal with affective, rather than cognitive, subjectivity. The subject's emotional responses (i.e., happiness, fear, anxiety, confidence, etc.) are what are important. Knowledge questions, on the other hand, seek factual information regarding what the subject

knows. Questions of the fifth type, sensory questions, assess what a subject sees, hears, feels, tastes, or smells. Finally, background/demographic questions obtain information about a subject's identifying characteristics and may include age, educational level, annual income, place of residence, etcetera.

In developing our interview questions, we also sought to balance questions that probed respondents' beliefs about the importance of implementation of the QSM with those that probed the degree to which they saw evidence of the QSM in practice in their district. The former primarily utilized opinion/belief and feeling phrases, while the latter employed knowledge and sensory probes. Both experience/behavior questions and background/demographic responses provided us with clarifying information about interview participants. While the interview questions we used short (five questions) and broad, they provided a good deal of useful information without "leading" the participants toward a predetermined response. The questions used for interviews were

1. What do you know about the Quality Schools Model?
2. Is the Quality Schools Model important to you?
3. What is working well with the Quality Schools Model?
4. What could be improved with the Quality Schools Model?
5. What recommendations or suggestions do you have for improving the Quality Schools Model?

3.6.4 Interview Protocol

Eisner (1998, p. 183) warned that "interviews need not—indeed, should not—be formal, questionnaire-oriented encounters. The aim is for the interviewer to put the person at ease, to have some sense of what he or she wants to know, but not to be either rigid or mechanical in method." A semi structured, open-ended interview format was selected in order to allow follow-up prompts that would help to elicit rich responses while also reducing the possibility of interviewer variance (Groves et al., 2004, p. 281). Groves et al. explained that "one of the most effective ways to reduce interviewer variance is to create questions that do not require the interviewers to vary their behavior over respondents. The variation of importance here concerns clarifying questions and probing inadequate answers" (p. 281). Consistency between interviews was important in this case because two different interviewers collected the data for the cohort. The following five suggestions were given by Groves et al. for standardizing the data-collection process:

1. Interact with the respondent in a way that is professional and task oriented, and that minimizes the potential of respondents to adhere to or infer preferences for the kinds of answers that are obtained.
2. Read question exactly as worded.
3. Explain the survey procedures and question-and-answer process to the respondent.
4. Probe nondirectly; that is, in a way that does not increase the likelihood of one answer over others.

5. Record answers that respondents give without interpreting, paraphrasing, or inferring what respondents themselves have not said.

The interview protocol specified the questions, the sequence in which they were asked, and guidelines for what the interviewer was to say at the beginning and end of each interview (Gall et al., 2007). Notes and tape recording preserved information collected during the interviews. Interviews were transcribed verbatim for later analysis. Where possible, interviews were conducted in person in the interviewee's community. When that was not possible due to our travel limitations, interviews were conducted at a location and time of mutual convenience, such as at a conference or by telephone. The setting and mode (face-to-face or telephone) for each interview was recorded on the interview protocol form.

3.7 Analysis of Qualitative Data

Using the taped recordings of the interviews, we had the sessions transcribed verbatim into word-processed documents, and these transcripts served as the data set for analysis. I used an inductive approach for the qualitative data analysis. Thomas (2003) said, "The primary purpose of the inductive approach is to allow research findings to emerge from the frequent, dominant or significant themes inherent in the raw data, without the restraints imposed by more structured methodologies" (p. 2). The results from an inductive approach are very similar to those obtained through a grounded theory approach but without the use of specialized terminology to describe the elements of the process.

The inductive approach to qualitative data analysis has several underlying assumptions (Thomas, 2003, p. 3-4). First, the findings are determined both inductively (through interpretation of the raw data) and deductively (by connection to the research objectives). Second, the primary feature of the inductive approach is the development of categories from the raw data that capture the most important themes in the data. Another important feature of inductive analysis is that the findings are shaped by the assumptions and experiences (the mental models) of the researcher. Different researchers, such as in our cohort, are likely to produce findings that are non-identical and that may not overlap. For this reason all of us could use the same set of interviews and obtain different findings.

Following the methodology described by Thomas (2003) I first read all of the transcripts without marking them to get an overall impression of the breadth and depth of the data and noticing patterns in the responses and connections to important knowledge concepts. Reading the transcripts the second time, I highlighted segments of the text that had knowledge-related meaning and noted either a descriptive or interpretive phrase in the margin. Descriptive coding requires little interpretation of the data and focuses on key words or phrases as the basis for creating and assigning codes while interpretive coding focuses more on the underlying meaning or concept represented by the interview data. During this step, I also numbered the text segments sequentially for ease in referring back to them and tabulation of the results. Throughout this process I tried to be mindful of several caveats from the literature regarding the coding process. Lincoln and Guba (1985) advised that categories should

be viewed as temporary during the beginning stages of coding. Tesch (1990) stressed that the objective of qualitative analysis is not merely to make the data smaller or manageable, but to interpret and organize the data for meaning.

From the initial coding I could see that some themes were repeated in a number of interviews – for example, four participants questioned whether the focus of the QSM on individual student achievement was consistent with traditional Native cooperative learning philosophy and "codification and record keeping are time intensive" was repeated five times.

The second step in coding the interview text was to place the themes into more general categories that I identified deductively as the four knowledge subscales of this research. Then I arranged the themes according to their associated research question. This process resulted in two more observations about the interview data that are common in qualitative coding (Thomas, 2003). The first observation was that the text could sometimes be coded to more than one of the knowledge subscales. For instance the meaning of the text for the theme, "[QSM] fosters an increase of knowledge sharing, adopting and adapting" could lead to placement in the knowledge creation factor or in the organizational knowledge use factor. The second observation was more significant because it related to sticky transfer and ambivalence about change. Specifically, some of the text included positive statements related to the importance of the QSM while at the same time noting challenges or negative features of the model. Some of the text illustrated ambivalence about implementation of the QSM with "yes-

but" or similar rhetoric. I found ambivalent statements related to the themes of stakeholder communication, knowledge availability, and time and use of technology.

Thomas (2003, p. 9) noted that the inductive analysis process can be considered complete when the data has been reduced to between 3-8 main themes or categories. For this set of interviews, 7 major themes emerged.

3.8 Triangulation of Data

Various terms are used in the literature to describe the practice of considering multiple sources of data in order to accomplish a fuller understanding of the phenomena studied (Bogden & Biklen, 2003). The most frequently used term, *triangulation*, refers to "cross-validation among data sources, data collection strategies, time periods, and theoretical schemes" (McMillan & Schumacher, 2001, p. 478). Eisner (1998) proposed the term *structural corroboration* for identifying "the means through which multiple types of data are related to each other to support or contradict the interpretation and evaluation of a state of affairs" (p. 110). The purpose for collecting data through a questionnaire and interviews was to describe the implementation of the QSM in a way that reflected the stakeholder-inclusive design of the QSM framework and the comprehensive consideration of quality as defined by the Baldrige criteria. Both sources of information were integrated during the analysis phase.

CHAPTER FOUR: RESULTS

This chapter presents the quantitative and qualitative results of this study of knowledge factors related to the implementation of the QSM, measured using Baldrige in Education constructs. The quantitative results were derived from a Web-based questionnaire tool designed by this research cohort. The questionnaire contained 72 items, with a Likert scale for belief responses (*strongly disagree*, *disagree*, *agree*, *strongly agree*) on the left side of the questions, and another Likert scale for practice responses (*never*, *occasionally*, *frequently*, *always*) on the right side of the questions, for a total of 144 responses per participant. Qualitative data were gathered through interviews with 14 school staff and community members.

Research Question 1 used responses from the belief scale, and Research Question 2 used responses from the practice scale. Research Question 3 looked at differences between the belief and practice scale responses. Research Question 4 used the practice scale responses to test theory about relationships among the seven Baldrige in Education constructs. The qualitative data are summarized in this chapter, and then the two sets of data are combined in Chapter 5. This chapter is organized with the hypotheses restated first, followed by quantitative analysis results and then results of the qualitative interviews.

4.1 Research Questions and Hypotheses

Question 1: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs, *to be important* within the Quality Schools Model of education reform?

Hypothesis 1.1: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between administrators, teachers, and classified staff.

Hypothesis 1.2: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between teachers based on years of education experience and based on years of experience in the QSM district.

Hypothesis 1.3: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between participants based on years of education experience and based on years of experience in the QSM district.

Question 2: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs, *to be in practice* within the Quality Schools Model of education reform?

Hypothesis 2.1: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between administrators, teachers, and classified staff.

Hypothesis 2.2: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between teachers based on years of education experience and based on years of experience in the QSM district.

Hypothesis 2.3: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between participants based on years of education experience and based on years of experience in the QSM district.

Question 3: Are there statistically significant differences in participants' belief scale mean scores and practice scale mean scores for knowledge factors, and are those differences statistically significant between groups?

Question 4: What are the relationships among the Baldrige in Education Criteria that describe the Quality Schools Model, based on these research data?

Hypothesis: Knowledge Management has either a direct or indirect effect on all other Baldrige criteria, as shown in the Baldrige theoretical model.

The quantitative results are presented in six sections. The first section includes the statistical analysis to validate the set of knowledge-related variables and factors used to answer the research questions. The second section answers Research Question 1 using belief scale knowledge variables and factors; the next section answers Research Question 2 using practice scale knowledge variables and factors; the fourth

section provides analysis to answer Research Question 3; and the last section presents the CFA and SEM analysis related to Research Question 4 using practice scale data.

4.2 Selection of Knowledge Management Variables and Factor Analysis

As described in Chapter 3, 17 knowledge-related variables were identified from the Quality Schools Model Implementation Questionnaire. The 17 items were subjected to PCA using SPSS 15.0. This was done twice, once for the items from the belief scale and then for the items from the practice scale. Prior to performing the PCA, the suitability of the data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above for each scale. The Kaiser-Meyer-Olkin value was .938 for the belief scale and .942 for the practice scale, exceeding the recommended value of .6, and Bartlett's Test of Sphericity was statistically significant at $p < .05$ for both scales, supporting the factorability of the items. Using PCA with Varimax rotation, 15 of the variables loaded on one factor, with the other 2 loading on a second factor. All of the variables had good communalities, with values higher on the belief scale than for the practice scale, as shown in Table 4.1. The communalities show that the items do measure the construct of knowledge management.

Table 4.1 Communalities for Knowledge Belief and Practice Sets

Questionnaire item Extraction method: PCA with Varimax rotation	Extraction—Belief	Extraction--Practice
7. We revise and change the type of performance data we collect as our needs and direction change.	.85	.52
11. Our schools continually evaluate how we determine the educational needs of our students.	.87	.63
13. Our schools have data that enables us to monitor trends in the levels of student/family satisfaction over the past three years.	.84	.41
17. Our district measures staff learning and development in areas such as collaboration and knowledge/skills sharing.	.81	.50
20. District and school staff can quickly get information they need to make improvements in their work.	.80	.53
22. Our district's performance is analyzed and the data is used in the strategic plan to improve our district.	.81	.55
24. Our school district's strategic plan is based on an analysis of a variety of data.	.78	.52
25. Performance review results are analyzed and used to improve district leadership and staff performance.	.86	.54
27. Our district ensures that software and hardware systems (computers, internet, networks) are current with our district's needs.	.93	.63
28. I know how well our students are performing compared to similar schools.	.87	.42
29. Our district provides a computerized data management system for staff to utilize.	.93	.62
40. The district has effective ways to communicate important information to students.	.80	.46
44. Information about best practices is collected and shared among staff members.	.84	.64
52. The quality data our district gathers covers a broad scope and comes from a variety of sources.	.82	.64
57. The student/family data we collect is translated into solutions to student/family problems.	.88	.60
59. Our district uses comparisons with similar school districts to guide the improvement of quality and to improve instructional services.	.94	.49
71. When our schools review our student/family satisfaction results they are able to break the data into appropriate groups.	.83	.52

As explained in Chapter 3, though the principal component factor analysis only suggested two factors, theory and knowledge management research were used as a basis for identifying four possible factors for a confirmatory factor analysis for knowledge management. I hypothesized that variables 7, 11, 13, 28, and 52 would load on Knowledge Creation and Gathering; variables 20, 27, 29, and 71 would load on Knowledge Availability; variables 22, 24, 25, and 59 would load on Knowledge Analysis and Use; and variables 17, 40, 44, and 57 would load on the Organizational Knowledge Use factor. I further hypothesized that the four first-order latent endogenous variables would completely explain the second-order latent exogenous factor of Knowledge Management. Consistent with Byrne's (2001, p. 121) description for creating a second-order CFA model, error terms were left uncorrelated. The second order model used for the QSM Knowledge Management CFA is shown in Figure 4.1. The CFA was run twice, once for the belief variables and then again for the practice variables.

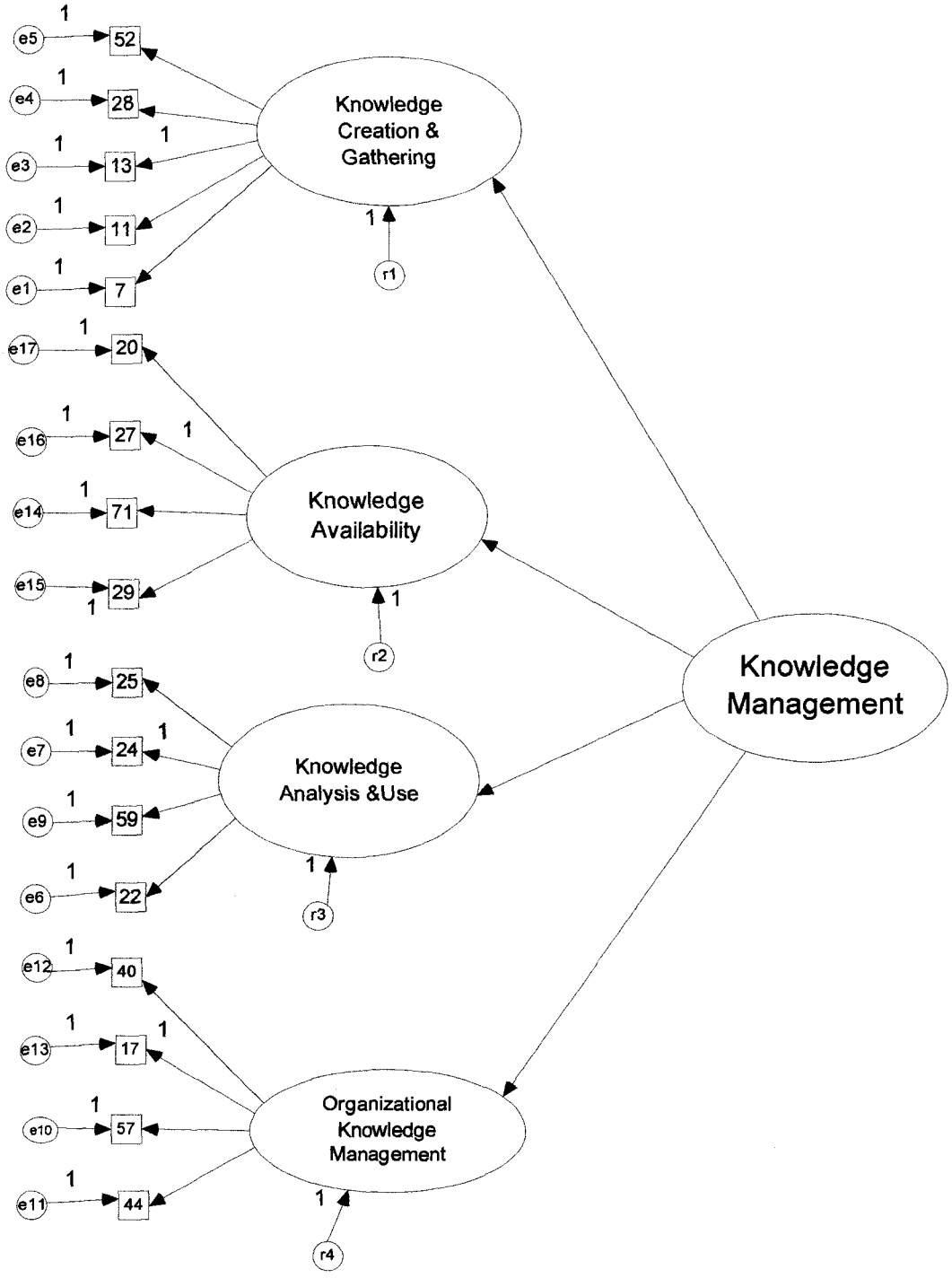

Figure 4.1 Second Order CFA Structure Used for Knowledge Belief and Practice Subscales

Table 4.2 shows the standardized regression scores for individual measurement variables on the belief and practice scales as they loaded on the four first-order latent knowledge variables in CFA. The standardized regression loadings are indicators of reliability of each of the items to measure the factor construct. Item 27 was low on both the belief and practice scale, but I decided to retain it based on the content of the question. The R^2 value for the four latent subscales are all > .890, which indicates that a high percentage of the variation in each subscale is explained by the variables included in the subscale, with a relatively low variance due to measurement error.

Table 4.2 Maximum Likelihood Standardized Regression Weights for Belief and Practice Variables

$p < .01$

Variable			β belief	S.E. belief	R^2 belief	β practice	S.E. practice	R^2 practice
Knowledge Creation & Gathering	<---	Knowledge Management	.973	.819	.948	.943		.890
Knowledge Availability	<---	Knowledge Management	.986	.601	.972	.966		.934
Knowledge Analysis & Use	<---	Knowledge Management	.961	.827	.988	.960		.990
Organizational Knowledge Use	<---	Knowledge Management	.994	.871	.923	.995		.921
13	<---	Knowledge Creation & Gathering	.663		.440	.617		.381
11	<---	Knowledge Creation & Gathering	.630		.397	.723	.128	.522
7	<---	Knowledge Creation & Gathering	.611	.100	.374	.639	.109	.408
52	<---	Knowledge Creation & Gathering	.753	.110	.567	.796	.124	.633
28	<---	Knowledge Creation & Gathering	.562	.125	.316	.531	.127	.282
22	<---	Knowledge Analysis & Use	.776	.077	.602	.744	.091	.554

Table 4.2, continued

Variable			β belief	S.E. belief	R^2 belief	β practice	S.E. practice	R^2 practice
25	<---	Knowledge Analysis & Use	.752	.082	.565	.737	.105	.543
24	<---	Knowledge Analysis & Use	.792		.627	.735		.540
59	<---	Knowledge Analysis & Use	.556	.094	.309	.664	.095	.441
27	<---	Knowledge Availability	.519		.269	.439		.193
29	<---	Knowledge Availability	.618		.382	.582	.273	.339
20	<---	Knowledge Availability	.763	.208	.582	.721	.294	.521
71	<---	Knowledge Availability	.804	.224	.524	.708	.299	.502
40	<---	Organizational Knowledge Use	.807	.094	.651	.636	.091	.404
57	<---	Organizational Knowledge Use	.729	.096	.531	.750	.104	.562
17	<---	Organizational Knowledge Use	.746		.556	.675		.456
44	<---	Organizational Knowledge Use	.800	.097	.640	.787	.106	.619

The squared multiple correlations (SMC) of the latent variable scores provide an indication of the stability of the latent variables. High SMC scores indicate good stability of the variables. The SMC scores for the four latent knowledge variables are in Table 4.3.

Table 4.3 Squared Multiple Correlation Values for Knowledge Subscales

Factor correlation			R^2 belief	R^2 practice
Knowledge Creation & Gathering	<-->	Knowledge Availability	.960	.926
Knowledge Creation & Gathering	<-->	Organizational Knowledge Use	.967	.936
Knowledge Analysis & Use	<-->	Knowledge Availability	.947	.928
Knowledge Availability	<-->	Organizational Knowledge Use	.980	.937
Knowledge Creation & Gathering	<-->	Knowledge Analysis & Use	.935	.927
Knowledge Analysis & Use	<-->	Organizational Knowledge Use	.955	.938

Other goodness of fit statistics also show that the belief and practice measurement models are acceptable, in Table 4.4.

Table 4.4 Model Fit Statistics for Knowledge Management Belief and Practice CFA Models

Model	χ^2	*df*	χ^2/df	P	CFI	GFI	RMSEA
Belief	254.30	112	2.271	<.001	.927	.876	.078
Practice	224.292	115	1.95	<.001	.935	.886	.067

After establishing that the variables as assigned a priori reliably measured the four latent knowledge variables, I summed and averaged the measurement variables so I could integrate the four subscales into a first-order CFA. Then these single indicator subscales were reevaluated using maximum likelihood estimation to confirm their factor structure and that they would be suitable for answering research questions 1, 2,

and 3. The first-order CFA for the belief subscale variables is presented first, followed by the first-order CFA for the practice subscale variables. Skewness and kurtosis were checked, and are reported in Table 4.13 for belief subscales and Table 4.20 for practice subscales. Mahalanobis distance was used to check for univariate and multivariate outliers, with no cases ultimately removed. Figure 4.2 shows the measurement model for the four knowledge management belief subscales. The standardized regression weights are shown in the figure next to the parameter from the latent factor to each variable. The squared multiple correlation value is also shown in the figure to the right of each variable.

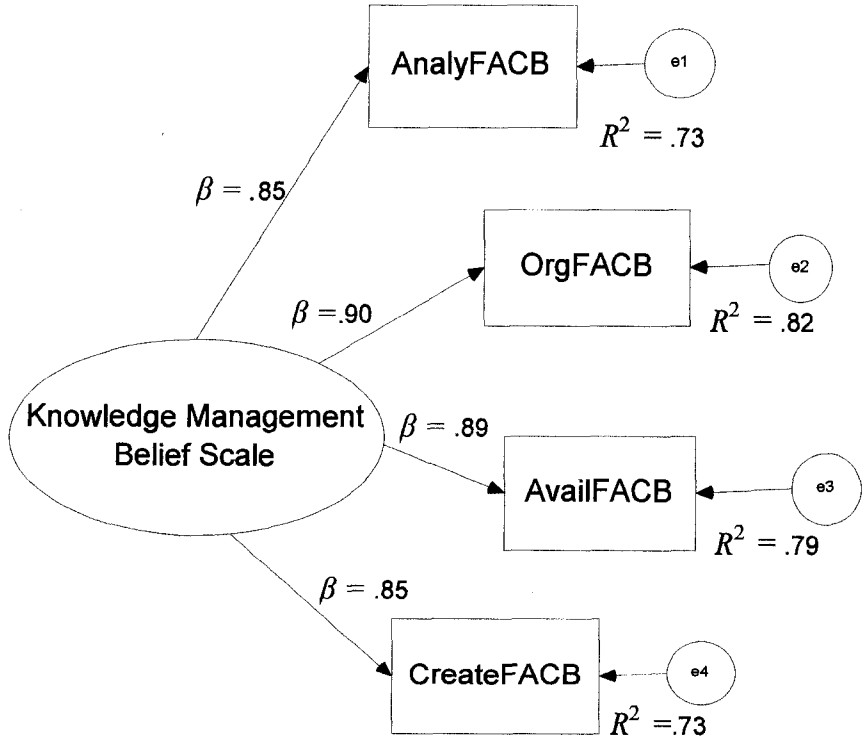

Figure 4.2 Structural Model for Knowledge Management Belief Subscales

Table 4.5 shows the estimates, standard errors, and goodness of fit statistics for the belief scale measurement model. RMR is the root mean square residual, where the smaller the score the better; 0 indicates a perfect fit.

Table 4.5 Maximum Likelihood Parameter Estimates for Knowledge Belief CFA Model

		Estimate	S.E.	C.R.	*p*
AvailFACB	<--- Knowledge Management Belief Scale	.997	.059	17.033	***
AnalyFACB	<--- Knowledge Management Belief Scale	1.000			
OrgFACB	<--- Knowledge Management Belief Scale	1.146	.065	17.562	***
CreateFACB	<--- Knowledge Management Belief Scale	.960	.060	15.917	***

Fit Statistics
$\chi^2/df = .422$
RMR = .001
GFI = .998

***Significant probability < .01

The correlation matrix for the knowledge belief subscales in Table 4.6 shows high correlation between the latent variables meaning they are all measuring knowledge constructs.

Table 4.6 Correlation Matrix for Knowledge Belief Subscales

	OrgFACB	CreateFACB	AvailFACB
CreateFACB	.77		
AvailFACB	.81	.76	
AnalyFACB	.77	.74	.75

Table 4.7 shows that Organizational Knowledge Use and Knowledge Availability are the two highest weighted indicators in the knowledge belief CFA model, while Knowledge Creation and Knowledge Analysis are slightly less important. No one indicator is far more important than the others, useful information for interpreting the results from Research Question 1.

Table 4.7 Factor Score Weights for Knowledge Belief CFA Model

	OrgFACB	CreateFACB	AvailFACB	AnalyFACB
Knowledge Management Belief Scale	.27	.19	.26	.18

Next, I created a first-order CFA model using maximum likelihood estimation for the practice scale subscales as indicator variables, similar to the procedure used for the belief scale. Figure 4.3 shows the practice scale CFA model with standardized regression weights and squared multiple correlations for each subscale variable.

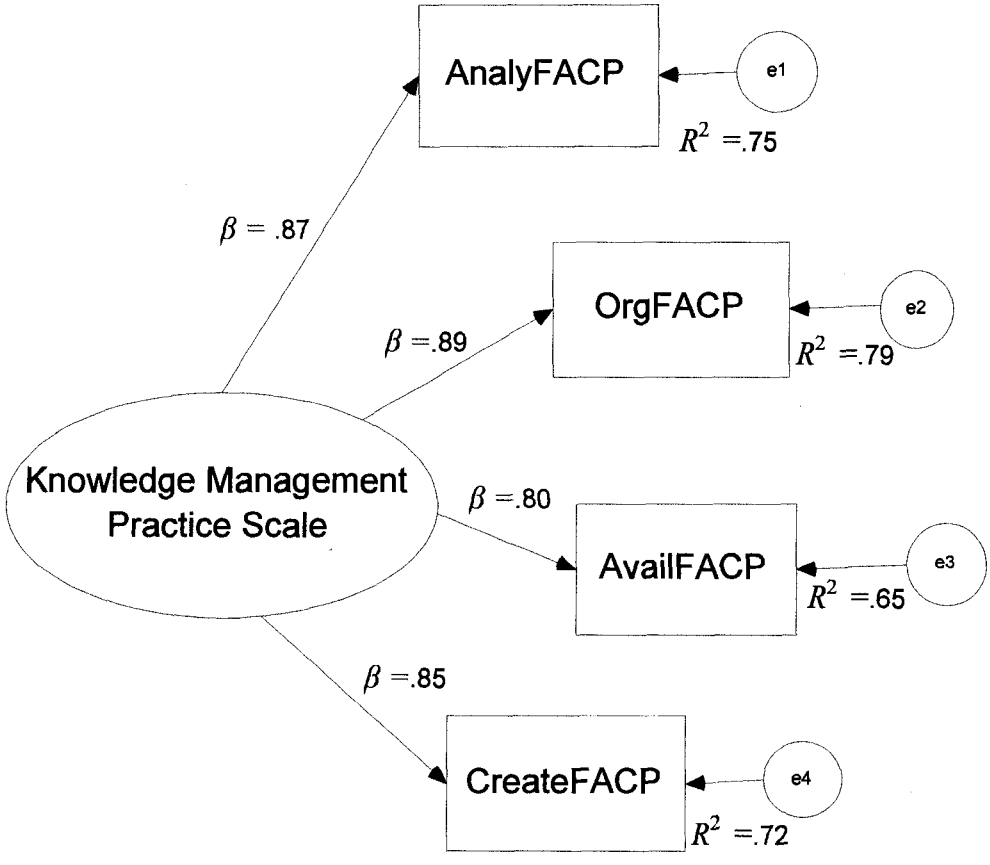

Figure 4.3 Structural Model for Knowledge Practice Subscales

Table 4.8 shows the estimates, standard errors, and goodness of fit statistics for the practice scale measurement model.

Table 4.8 Maximum Likelihood Parameter Estimates for Knowledge Practice CFA Model

			Estimate	S.E.	C.R.	*p*
AvailFACP	<---	Knowledge Management Practice Scale	.900	.062	14.431	***
AnalyFACP	<---	Knowledge Management Practice Scale	1.000			
OrgFACP	<---	Knowledge Management Practice Scale	1.096	.064	17.050	***
CreateFACP	<---	Knowledge Management Practice Scale	.933	.059	15.775	***

Fit Statistics
$\chi^2/df = 1.265$
RMR = .004
GFI = .994

***Significant probability < .01

The correlation matrix for the knowledge practice subscales in Table 4.9 shows high correlation between the subscales meaning they are all measuring knowledge constructs, similar to the results for the belief subscales.

Table 4.9 Correlation Matrix for Knowledge Practice Subscales

	OrgFACP	CreateFACP	AvailFACP
CreateFACP	.76		
AvailFACP	.73	.66	
AnalyFACP	.76	.75	.70

Table 4.10 shows that Organizational Knowledge Use is again the highest weighted indicator for the knowledge practice CFA model, just as it was for the belief model. For the practice scale model however, Knowledge Availability is far less important than it was for the belief model. Knowledge Creation and Knowledge Analysis and Use are slightly more important in the practice model than they were in the belief model.

Table 4.10 Factor Score Weights for Knowledge Practice CFA Model

	OrgFACP	CreateFACP	AvailFACP	AnalyFACP
Knowledge Management Practice Scale	.29	.23	.17	.25

As a last indicator, I calculated Cronbach's alpha for the whole set of variables for each scale and for the four subscales as one additional measure that the variables of the factor scale had internal reliability for measuring the construct. All of the factor scores were > .70, showing very acceptable reliability that the items measured related concepts, shown in Table 4.11.

Table 4.11 Cronbach's Alpha for Knowledge Management Belief and Practice Subscales, $N = 212$

Items	Belief scale α	Practice scale α
All Knowledge Management items	**.93**	**.93**
Subscales:		
Knowledge Creation & Gathering	.78	.79
Knowledge Analysis & Use	.81	.80
Knowledge Availability	.75	.72
Organizational Knowledge Use	.82	.80

4.3 Analysis for Research Question 1

4.3.1 Research Question 1 and Hypotheses

Research Question 1 asked to what extent administrators, staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs, *to be important* within the Quality Schools Model of education reform. Three hypotheses predicted that job category, years of total education experience, and years of experience with the QSM would all affect participants' perceptions about the importance of the four knowledge subscales.

4.3.2 Descriptive Statistics and Assumptions Tests for Belief Scale Variables and Subscales

Once the knowledge variables and subscales were identified and validated statistically, univariate and bivariate descriptive statistics were computed to assess normality of distribution of the data. Means for the knowledge subscales on the belief

scale were all positive (agree). The descriptive summary for the belief scale is shown in Table 4.12.

Table 4.12 Univariate and Bivariate Descriptive Statistics for Belief Scale

Response distribution, means, and standard deviations for Knowledge Management dependent variables

Belief scale

$N = 212$

	Strongly disagree		Disagree		Agree		Strongly agree		*M*	*SD*
Factor/Variable	*N*	%	*N*	%	*N*	%	*N*	%		
Knowledge Creation and Gathering									**3.40**	**.458**
7	2	.9	5	2.4	106	50.0	99	46.7	3.42	.591
11	1	.5	5	2.4	65	30.7	141	66.5	3.63	.556
13	2	.9	17	8.0	95	44.8	98	46.2	3.36	.671
28	4	1.9	29	13.7	111	52.4	68	32.1	3.15	.717
52	1	.5	10	4.7	96	45.3	105	49.5	3.44	.609
Knowledge Analysis and Use									**3.40**	**.477**
22	1	.5	4	1.9	78	36.8	129	60.8	3.58	.558
24	1	.5	8	3.8	92	43.4	111	52.4	3.48	.596
25	2	.9	8	3.8	112	52.8	90	42.5	3.37	.605
59	2	.9	22	10.4	123	58.0	65	30.7	3.18	.645
Knowledge Availability									**3.50**	**.457**
20	9	4.2	60	28.3	91	42.9	52	24.5	3.51	.604
27	3	1.4	34	16.0	86	40.6	89	42.0	3.63	.557
29	11	5.2	25	11.8	66	31.1	110	51.9	3.57	.584
71	19	9.0	83	39.2	78	36.8	32	15.1	3.29	.665
Organizational Knowledge Use									**3.38**	**.517**
17	3	1.4	17	8.0	104	49.1	88	41.5	3.31	.678
40	1	.5	5	2.4	99	46.7	107	50.5	3.47	.571
44	3	1.4	5	2.4	90	42.5	114	53.8	3.49	.619
57	4	1.9	17	8.0	111	52.4	80	37.7	3.26	.684

Box plots were examined for the knowledge belief subscales to determine if there were any outlier scores. As a few outlier scores were found, the 5% trimmed mean was compared to the factor mean to determine the effect of the outlier scores. The percent differences in the mean and trimmed means were as follows: Knowledge Creation .02; Knowledge Analysis and Use .02; Knowledge Availability .03; and Organizational Knowledge .04. The outlier cases were left in for analysis because they did not have a large effect on the mean scores.

The skewness and kurtosis of the knowledge variables are shown in Table 4.13 for belief variables and subscales. None of the kurtosis values was > 3, so even though the data exhibited slight skewness and peakedness, the range of values was acceptable. The negative skewness shows that responses were skewed in the direction of *agree* and *strongly agree*. Tabachnick and Fidel (2007) stated that with a reasonably large sample (i.e., > 200 cases), "a variable with statistically significant skewness often does not deviate enough from normality to make a substantive difference in the analysis" (p. 80). The positive kurtosis numbers show that the distribution of scores is peaked, likely a result of the design of the questionnaire with four response choices.

Table 4.13 Skewness and Kurtosis for Knowledge Variables and Subscales Using Belief Scale , $p = .01$

Variable	Min	Max	skew	c.r.	kurtosis	c.r.
20	1.000	4.000	-.960	-5.707	.568	1.688
59	1.000	4.000	-.403	-2.396	.235	.698
7	1.000	4.000	-.740	-4.397	1.049	3.118
11	1.000	4.000	-1.362	-8.096	1.794	5.332
57	1.000	4.000	-.735	-4.371	.732	2.175
44	1.000	4.000	-1.146	-6.810	1.914	5.688
40	1.000	4.000	-.654	-3.888	.312	.927
17	1.000	4.000	-.737	-4.380	.504	1.497
71	1.000	4.000	-.592	-3.518	.141	.419
24	1.000	4.000	-.785	-4.668	.354	1.051
28	1.000	4.000	-.532	-3.160	.083	.248
29	1.000	4.000	-1.279	-7.602	2.090	6.212
52	1.000	4.000	-.712	-4.232	.196	.582
27	2.000	4.000	-1.172	-6.968	.383	1.138
25	1.000	4.000	-.640	-3.805	.807	2.399
22	1.000	4.000	-1.058	-6.290	1.040	3.092
13	1.000	4.000	-.766	-4.550	.259	.771
Multivariate					107.629	30.828
Knowledge Analysis and Use	1.000	4.000	-.714	-4.246	1.664	4.947
Creation	1.600	4.000	-.642	-3.817	.247	.736
Availability	1.500	4.000	-.900	-5.348	.974	2.894
Organizational Knowledge Use	1.250	4.000	-.900	-5.347	1.597	4.748

The Mahalanobis distance test was performed to check the critical values of χ^2 for multivariate normality; for 17 variables where $p = .050$, the value is 27.587. All cases met this assumptions test so all 212 were retained.

4.3.3 Research Question 1 Hypothesis 1

Hypothesis 1.1 predicted a significant difference in the mean score on the "belief in importance" scale for knowledge subscales between administrators, teachers, and classified staff. To test the hypothesis, a one-way between-groups analysis of variance was conducted to explore the impact of job classification on the four knowledge belief subscales. Participants were divided into three groups based on their job within the school system (administrator, teacher, and classified staff). Means for each group for each factor are shown in Table 4.14.

Table 4.14 Means and Standard Deviation for Knowledge Belief Subscales by Job Classification

Factor	Job classification	*N*	*M*	*SD*
Knowledge Analysis and Use	Administrator	36	3.60	.340
	Teacher	132	3.38	.487
	Classified	44	3.32	.506
	Total	212	3.40	.477
Knowledge Creation	Administrator	36	3.56	.393
	Teacher	132	3.38	.467
	Classified	44	3.33	.460
	Total	212	3.40	.458
Knowledge Availability	Administrator	36	3.67	.352
	Teacher	132	3.46	.488
	Classified	44	3.48	.413
	Total	212	3.50	.457
Organizational Knowledge Use	Administrator	36	3.55	.357
	Teacher	132	3.34	.565
	Classified	44	3.35	.448
	Total	212	3.38	.516

Levene's test for homogeneity of variances was > .05 for each factor, showing that the assumption for homogeneity of variances was met. Statistically significant differences at the $p < .05$ level were found between the job classification groups on Analysis and Use of Knowledge and Availability of Knowledge belief subscales shown in Table 4.15.

Table 4.15 One-Way Analysis of Variance for Effects of Job Classification on Knowledge Belief Subscales

Factor		Sum of squares	*df*	Mean square	*F*	*p*
Knowledge Analysis and Use	Between groups	1.877	2	.938	**4.238***	.016
	Within groups	46.280	209	.221		
	Total	48.157	211			
Knowledge Creation	Between groups	1.211	2	.605	2.932	.055
	Within groups	43.149	209	.206		
	Total	44.360	211			
Knowledge Availability	Between groups	1.317	2	.658	**3.205***	.043
	Within groups	42.933	209	.205		
	Total	44.250	211			
Organizational Knowledge Use	Between groups	1.222	2	.611	2.318	.101
	Within groups	55.083	209	.264		
	Total	56.305	211			

*$p < .05$

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for administrators ($M = 3.60$, $SD = .340$) was significantly higher than the mean score for teachers ($M = 3.37$, $SD = .488$) on the Knowledge Analysis and Use factor. The difference between administrators ($M = 3.60$, $SD = .340$) and classified staff ($M = 3.32$, $SD = .506$) was also significant for the Knowledge Analysis and Use factor. The second factor with statistically significant differences was Knowledge Availability. The mean score for administrators ($M = 3.67$, $SD = .352$) was significantly higher than the mean score for teachers ($M = 3.46$, $SD = .488$). All differences were significant at $p < .05$ level.

Despite reaching statistical significance, the actual effect score for the relationship between job classification and belief subscales, calculated by eta squared,

was quite small. Eta squared statistics indicate the proportion of variance of the dependent variable that is explained by the independent variable. A small effect is between .01 - .05; medium is from .06 - .12; and when the effect is > .13, the difference is considered highly important (Pallant, 2007, p. 208; Tabachnick & Fidell, 2007, p. 55). Table 4.16 shows the eta squared values for this analysis.

Table 4.16 Measures of Association: Belief Subscales to Job Classification

Factor name	Eta	Eta squared
Knowledge Analysis and Use * Job Classification	.197	.039
Knowledge Creation * Job Classification	.165	.027
Knowledge Availability * Job Classification	.172	.030
Organizational Knowledge Use * Job Classification	.147	.022

4.3.4 Research Question 1 Hypothesis 2

Hypothesis 1.2 predicted a significant difference in the mean score on the "belief in importance" scale for knowledge subscales between teachers based on years of education experience and between teachers based on years of experience in the QSM district. A one-way between-groups analysis of variance was conducted to explore the impact of years of education experience on knowledge belief subscales for the teacher group of participants. Teachers were divided into three groups according to years of education experience (Group 1: 3 years or less of experience; Group 2: 4 to 10 years of experience; and Group 3: 11 years or more of experience). Levene's test for homogeneity of variances was > .05 for each factor, showing that the assumption for homogeneity of variances was met. There were no statistically significant

differences between the teacher groups at the $p < .05$ level for any of the belief subscales based on years of education experience: Knowledge Analysis and Use, $F(2,129) = 2.186, p = .116$; Knowledge Creation, $F(2,129) = 1.183, p = .310$; Knowledge Availability, $F(2,129) = 2.582, p = .080$; and Organizational Knowledge Use, $F(2,129) = 2.872, p = .060$.

One-way between-groups analysis of variance was then used to determine whether there were statistically significant differences in means for all four knowledge belief subscales for the teacher group as years of experience working in a school district that had adopted the QSM increased. For all subscales, the mean score on the belief scale decreased for teacher participants as years of experience in the QSM district increased, though no statistically significant differences were found, as shown in Table 4.17.

Table 4.17 One-Way Analysis of Variance for Effects of Years of Experience in QSM District on Knowledge Belief Subscales for Teachers

		N	*M*	*SD*	*F*	*p*
Knowledge Analysis and Use	3 yrs. or less in QSM district	71	3.41	.542		
	4 to 10 yrs. in QSM district	47	3.40	.395		
	11 or more yrs. in QSM district	14	3.11	.412		
	Total	132	3.38	.487	2.421	.093
Knowledge Creation	3 yrs. or less in QSM district	71	3.39	.507		
	4 to 10 yrs. in QSM district	47	3.41	.432		
	11 or more yrs. in QSM district	14	3.21	.346		
	Total	132	3.38	.467	1.029	.360
Knowledge Availability	3 yrs. or less in QSM district	71	3.50	.538		
	4 to 10 yrs. in QSM district	47	3.45	.415		
	11 or more yrs. in QSM district	14	3.30	.440		
	Total	132	3.46	.488	.922	.400
Organizational Knowledge Use	3 yrs. or less in QSM district	71	3.38	.625		
	4 to 10 yrs. in QSM district	47	3.35	.476		
	11 or more yrs. in QSM district	14	3.16	.524		
	Total	132	3.34	.565	.879	.418

4.3.5 Research Question 1 Hypothesis 3

Hypothesis 1.3 predicted a significant difference in the mean score on the "belief in importance" scale for knowledge subscales between all participants based on years of education experience and based on years of experience in the QSM district. A one-way between-groups analysis of variance was conducted to explore the impact of years of education experience on knowledge belief subscales for all participants. Participants were divided into three groups according to their years of total education experience (Group 1: 3 years or less of experience, $N = 44$; Group 2: 4 to 10 years of experience, $N = 67$; and Group 3: 11 or more years of experience, $N = 101$). Levene's test for homogeneity of variances was $> .05$ for each factor, showing that the assumption for homogeneity of variances was met. There were no statistically significant differences at the $p < .05$ level between groups based on years of experience for knowledge belief subscales. For all four knowledge subscales, the mean score was highest for the group with 4 to 10 years of education experience, as shown in Table 4.18.

Table 4.18 One-Way Analysis of Variance for Effects of Years of Experience on Knowledge Subscales for Belief Scale, N = 212

	1–3 yrs. experience		4–10 yrs. experience		11 or more yrs. experience		ANOVAs
Factor	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Knowledge Analysis and Use	3.41	.400	3.44	.481	3.36	.506	.554
Knowledge Creation	3.36	.388	3.47	.441	3.36	.388	1.270
Knowledge Availability	3.48	.419	3.58	.390	3.45	.508	1.811
Organizational Knowledge Use	3.39	.404	3.47	.462	3.31	.583	2.108

Next, one-way between-groups analysis of variance was conducted to explore the impact of years of experience working in a QSM district on belief scale knowledge subscales for all participants. Participants were divided into three groups according to years of work experience in their current district (Group 1: 3 years or less of experience, $N = 101$; Group 2: 4 to 10 years of experience, $N = 71$; and Group 3: 11 or more years of experience, $N = 40$). Levene's test for homogeneity of variances was > .05 for each factor, showing that the assumption for homogeneity of variances was met. There were no statistically significant differences at the $p < .05$ level for any of the belief subscales, $df(2, 209)$: Knowledge Analysis and Use, $F = 1.589$, $p = .207$; Knowledge Creation, $F = 1.472$, $p = .232$; Knowledge Availability, $F = .843$, $p = .432$; and Organizational Knowledge Use, $F = 1.252$, $p = .288$.

4.4 Analysis for Research Question 2

4.4.1 Research Question 2 and Hypotheses

Research Question 2 posed the following question: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs, *to be in practice* within the Quality Schools Model of education reform? As in the case of Research Question 1, three hypotheses predicted that job category, years of total education experience, and years of experience with the QSM would all affect participants' perceptions about the existence of the four knowledge subscales.

4.4.2 Descriptive Statistics and Assumptions Tests for Practice Scale Variables and Subscales

Univariate and bivariate descriptive statistics were computed for practice scale variables and subscales to assess normality of distribution of the data. Means for all knowledge practice subscales were lower than the means for the corresponding belief factor. The descriptive summary for the practice scale is shown in Table 4.19.

Table 4.19 Univariate and Bivariate Descriptive Statistics for Practice Scale

Response distribution, means, and standard deviations for Knowledge Management dependent variables

Practice scale

$N = 212$

	Never		Occasionally		Frequently		Always		*M*	*SD*
Factor/Variable	*N*	%	*N*	%	*N*	%	*N*	%		
	Knowledge Creation and Gathering								**2.82**	**.603**
7	3	1.4	50	23.6	110	51.9	49	23.1	2.97	.725
11	7	3.3	51	24.1	89	42.0	65	30.7	3.00	.826
13	18	8.5	69	32.5	82	38.7	43	20.3	2.71	.887
28	24	11.3	80	37.7	77	36.3	31	14.6	2.54	.878
52	4	1.9	68	32.1	92	43.4	48	22.6	2.87	.780
	Knowledge Analysis and Use								**2.93**	**.633**
22	3	1.4	32	15.1	94	44.3	83	39.2	3.21	.746
24	5	2.4	42	19.8	93	43.9	72	34.0	3.09	.791
25	14	6.6	76	35.8	79	37.3	43	20.3	2.71	.864
59	12	5.7	69	32.5	101	47.6	30	14.2	2.70	.780
	Knowledge Availability								**2.99**	**.614**
20	1	.5	9	4.2	82	38.7	120	56.6	2.88	.828
27	0	0	8	3.8	63	29.7	141	66.5	3.23	.766
29	2	.9	4	1.9	77	36.3	129	60.8	3.30	.872
71	2	.9	19	9.0	107	50.5	84	39.6	2.58	.853
	Organizational Knowledge Use								**2.61**	**.675**
17	23	10.8	70	33.	76	35.8	43	20.3	2.66	.923
40	5	2.4	72	34.	97	45.8	38	17.9	2.79	.757
44	13	6.1	82	38.7	74	34.9	43	20.3	2.69	.863
57	39	18.4	87	41.0	70	33.0	16	7.5	2.30	.855

The skewness and kurtosis of the knowledge variables are shown in Table 4.20 for practice scale variables and subscales. None of the kurtosis values was > 3, so even

though the data exhibited slight skewness and peakedness, the range of values was acceptable. The negative skewness shows that responses were skewed in the direction of *agree* and *strongly agree*. The negative kurtosis numbers show that the distribution of scores was rather flat, unlike the belief subscales, where kurtosis was positive and distribution of scores was peaked.

Table 4.20 Skewness and Kurtosis for Knowledge Variables and Subscales Using Practice Scale

***p* = .01**

Variable	Min	Max	skew	c.r.	kurtosis	c.r.
20	1.000	4.000	-.220	-1.308	-.675	-2.007
59	1.000	4.000	-.151	-.898	-.379	-1.126
7	1.000	4.000	-.175	-1.041	-.505	-1.500
11	1.000	4.000	-.354	-2.104	-.669	-1.988
57	1.000	4.000	.121	.718	-.660	-1.962
44	1.000	4.000	.056	.334	-.836	-2.485
40	1.000	4.000	.035	.205	-.664	-1.973
17	1.000	4.000	-.100	-.594	-.855	-2.542
71	1.000	4.000	.047	.281	-.662	-1.967
24	1.000	4.000	-.456	-2.711	-.511	-1.520
28	1.000	4.000	.018	.105	-.707	-2.100
29	1.000	4.000	-1.087	-6.460	.338	1.004
52	1.000	4.000	-.007	-.040	-.860	-2.557
27	1.000	4.000	-.607	-3.610	-.453	-1.345
25	1.000	4.000	-.030	-.177	-.788	-2.341
22	1.000	4.000	-.570	-3.387	-.339	-1.009
13	1.000	4.000	-.131	-.777	-.758	-2.254
Multivariate					34.888	9.993
Analysis	1.000	4.000	-.293	-1.742	-.101	.300
Creation	1.200	4.000	-.120	-.713	-.505	-.1.499
Availability	1.500	4.000	-.266	-1.584	-.433	-1.287
Organizational Knowledge Use	1.000	4.000	.040	.238	-.524	-1.558

For the practice scale, box plots were examined for the knowledge subscales to determine if there were any outlier scores. As a few outlier scores were found, the 5% trimmed mean was compared to the subscale mean to determine the effect of the outlier scores. Similar to the belief scale, the percent differences between the subscale means and the 5% trimmed means were very small: Knowledge Creation .02; Knowledge Analysis and Use .01; Knowledge Availability .02; and Organizational Knowledge .00. The outlier cases were left in for analysis because they did not have a large effect on the mean scores.

Like the belief scale, the Mahalanobis distance test was performed to check the critical values of χ^2 for multivariate normality; for 17 variables where $p = .050$, the value is 27.587. All cases met this assumptions test so all 212 were retained.

4.4.3 Research Question 2 Hypothesis 1

Hypothesis 2.1 predicted a significant difference in the mean score on the "see this in practice" scale for knowledge subscales between administrators, teachers, and classified staff. To test the hypothesis, a one-way between-groups analysis of variance was conducted to explore the impact of job classification on the four knowledge practice subscales. Participants were divided into three groups based on their job within the school system (administrator, teacher, and classified staff). Levene's test for homogeneity of variances was > .05 for each factor, showing that the assumption for homogeneity of variances was met. Means for each group for each subscale are shown in Table 4.21

Table 4.21 Means and Standard Deviation for Knowledge Practice Subscales by Job Classification

Factor	Group	*N*	*M*	*SD*
Knowledge Analysis and Use	Administrator	36	3.26	.506
	Teacher	132	2.87	.603
	Certificated staff	44	2.83	.730
	Total	212	2.93	.632
Knowledge Creation	Administrator	36	3.12	.420
	Teacher	132	2.73	.608
	Certificated staff	44	2.84	.642
	Total	212	2.82	.603
Knowledge Availability	Administrator	36	3.27	.535
	Teacher	132	2.93	.593
	Certificated staff	44	2.98	.680
	Total	212	2.99	.614
Organizational Knowledge Use	Administrator	36	2.90	.551
	Teacher	132	2.51	.615
	Certificated staff	44	2.67	.850
	Total	212	2.61	.674

Statistically significant differences at the $p < .05$ level were found between the job classification groups for all four knowledge practice subscales, shown in Table 4.22. Post-hoc comparisons using the Tukey HSD test indicated that there were

significant differences between the administrator and teacher groups for all four subscales and between the administrator and classified staff groups for the knowledge analysis and use subscale.

Table 4.22 One-Way Analysis of Variance for Effects of Job Classification on Knowledge Practice Subscales

		Sum of squares	*df*	Mean square	*F*	Sig.
Knowledge Analysis and Use	Between groups	4.885	2	2.442	**6.408**	.002
	Within groups	79.652	209	.381		
	Total	84.536	211			
Knowledge Creation	Between groups	4.478	2	2.239	**6.468**	.002
	Within groups	72.341	209	.346		
	Total	76.819	211			
Knowledge Availability	Between groups	3.371	2	1.685	**4.624**	.011
	Within groups	76.189	209	.365		
	Total	79.560	211			
Organizational Knowledge Use	Between groups	4.581	2	2.290	**5.235**	.006
	Within groups	91.432	209	.437		
	Total	96.013	211			

$p < .05$

The eta squared effect size calculation showed that actual difference between mean scores between groups was moderately important for all four subscales, as shown in Table 4.23.

Table 4.23 Measures of Association: Job Classification to Knowledge Practice Subscales

Factor name	Eta	Eta squared
Knowledge Analysis and Use * Job Classification	.240	.057
Knowledge Creation * Job Classification	.241	.058
Knowledge Availability * Job Classification	.206	.042
Organizational Knowledge Use * Job Classification	.218	.048

4.4.4 Research Question 2 Hypothesis 2

The second hypothesis for Research Question 2 predicted a significant difference in the mean score on the "see this in practice" scale for knowledge subscales between teacher groups based on years of education experience and between teacher groups based on years of work experience in the QSM district. Means and standard deviation for the knowledge practice subscales for the groups are shown in Table 4.24. For the question based on years of overall education experience, participants were divided into three groups: teachers with 3 or fewer years of experience; teachers with 4 to 10 years of experience; and teachers with 11 or more years of experience. Results of a one-way between-groups ANOVA showed a statistically significant difference at the $p < .05$ level in the Organizational Knowledge factor for the three groups: $F(2, 132) = 3.229, p = .043$.

Table 4.24 Means and Standard Deviations for Knowledge Practice Subscales for Teacher Group by Years of Experience

		N	*M*	*SD*
Knowledge Analysis and Use	3 yrs. or less experience	32	2.92	.477
	4 to 10 yrs. experience	49	2.98	.546
	11 or more yrs. experience	51	2.74	.703
	Total	132	2.87	.603
Knowledge Creation	3 yrs. or less experience	32	2.67	.514
	4 to 10 yrs. experience	49	2.79	.621
	11 or > yrs. experience	51	2.70	.654
	Total	132	2.73	.608
Knowledge Availability	3 yrs. or less experience	32	2.97	.526
	4 to 10 yrs. experience	49	2.97	.595
	11 or > yrs. experience	51	2.85	.634
	Total	132	2.93	.593
Organizational Knowledge Use	3 yrs. or less experience	32	2.58	.569
	4 to 10 yrs. experience	49	2.64	.618
	11 or more yrs. experience	51	2.34	.614
	Total	132	2.51	.615

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the Organizational Knowledge Use factor for teachers with 4 to 10 years of experience (M = 2.637, SD = .618) was significantly higher than the mean score for teachers with 11 or more years of experience (M = 2.343, SD = .614).

When the teacher group was compared by years of experience in a QSM district using a one-way between-groups ANOVA, there were no significant differences in the mean scores between groups at the $p < .05$ level, though the mean scores increased as years of experience with the QSM increased up to 10 years of experience in the QSM district for all four subscales and continued to increase for the Knowledge Creation and Availability subscales for the group of teachers with the most QSM experience. The mean scores for the Knowledge Analysis and Use and Organizational Knowledge Use subscales peaked in the teacher group with 4 to 10 years of experience and then dropped for the group with 11 or more years of QSM experience shown in Table 4.25.

Table 4.25 One-Way Analysis of Variance for Effects of Years of Experience with QSM for Teachers on Knowledge Practice Subscales

		N	*M*	*SD*	*F*	Sig.
Knowledge Analysis and Use	3 yrs. or less in QSM district	71	2.85	.593		
	4 to 10 yrs. in QSM district	47	2.94	.576		
	11 or more yrs. in QSM district	14	2.75	.746		
	Total	132	2.87	.603	.633	.533
Knowledge Creation	3 yrs. or less in QSM district	71	2.67	.531		
	4 to 10 yrs. in QSM district	47	2.80	.698		
	11 or more yrs. in QSM district	14	2.77	.664		
	Total	132	2.73	.608	.641	.528
Knowledge Availability	3 yrs. or less in QSM district	71	2.92	.611		
	4 to 10 yrs. in QSM district	47	2.94	.549		
	11 or more yrs. in QSM district	14	2.89	.684		
	Total	132	2.93	.593	.038	.962
Organizational Knowledge Use	3 yrs. or less in QSM district	71	2.53	.615		
	4 to 10 yrs. in QSM district	47	2.51	.620		
	11 or more yrs. in QSM district	14	2.41	.640		
	Total	132	2.51	.615	.225	.799

4.4.5 Research Question 2 Hypothesis 3

Hypothesis 3 for Research Question 2 predicted that there is a significant difference in the mean score on the "see this in practice" scale for knowledge subscales between all participants ($N = 212$) based on years of education experience and between all participants based on years of experience in the QSM district. A one-

way between-groups ANOVA was performed to explore the impact of years of experience on the four knowledge practice subscales. Participants were divided into three groups according to their years of total education experience (Group 1: 3 years or less of experience, $N = 44$; Group 2: 4 to 10 years of experience, $N = 67$; and Group 3: 11 or more years of experience, $N = 101$). Levene's test for homogeneity of variances was > .05 for each factor, showing that the assumption for homogeneity of variances was met. There were no statistically significant differences at the $p < .05$ level between groups based on years of education experience for knowledge practice subscales. Means for each group for each factor are shown in Table 4.26.

Table 4.26 One-Way Analysis of Variance for Effects of Years of Education Experience for All Participants for Knowledge Practice Subscales

		N	Mean	*SD*	Sig.
Knowledge Analysis and Use	3 yrs. or less experience	44	2.90	.548	
	4 to 10 yrs. experience	67	2.96	.606	
	11 or more yrs. experience	101	2.92	.687	
	Total	212	2.93	.632	.834
Knowledge Creation	3 yrs. or less experience	44	2.73	.554	
	4 to 10 yrs. experience	67	2.82	.598	
	11 or more yrs. experience	101	2.86	.628	
	Total	212	2.82	.603	.460
Knowledge Availability	3 yrs. or less experience	44	2.99	.597	
	4 to 10 yrs. experience	67	2.99	.591	
	11 or more yrs. experience	101	3.01	.641	
	Total	212	2.99	.614	.994
Organizational Knowledge Use	3 yrs. or less experience	44	2.64	.663	
	4 to 10 yrs. experience	67	2.70	.612	
	11 or more yrs. experience	101	2.57	.721	
	Total	212	2.61	.674	.749

Next, one-way between-groups analysis of variance was conducted to explore the impact of years of experience working in the QSM district on practice scale knowledge subscales for all participants ($N = 212$). Participants were divided into three groups according to years of QSM experience (Group 1: 3 years or less of QSM experience, $N = 101$; Group 2: 4 to 10 years of QSM experience, $N = 71$; and Group 3: 11 or more years of QSM experience, $N = 40$). The mean scores for all groups were

very similar for all four practice subscales. There were no statistically significant differences at the $p < .05$ level for any of the practice subscales, $df(2, 209)$: Knowledge Analysis and Use, $F = .261, p = .771$; Knowledge Creation, $F = .061, p = .941$; Knowledge Availability, $F = .023, p = .977$; and Organizational Knowledge Use, $F = .362, p = .697$.

4.5 Analysis for Research Question 3

4.5.1 Research Question 3

Research Question 3 asked, "Are there statistically significant differences within and between respondent groups in perceptions of importance and practice of knowledge subscales as part of the Quality Schools Model?" Mixed between-within groups ANOVA was used to answer this question so that differences between groups for belief and practice responses could be compared in addition to differences in the belief and practice scores for participants within each group. A matrix of the independent and dependent variables used for the mixed between-within ANOVA with Research Question 3 was provided in Chapter 3. The steps in using a mixed between-within ANOVA include Levene's test and Box's test for assumptions, then examination of Wilks's lambda values to determine interaction effects between variables before examination of main effects and between-subjects effects can occur. This process was followed for all four of the within-between ANOVA analyses conducted to answer Research Question 3.

4.5.2 Research Question 3 Comparison Groups

Comparison groups were job classification (administrator, $N = 36$; teachers, $N = 132$; and classified staff, $N = 44$); years of education experience (Group 1: 3 years or less of experience, $N = 44$; Group 2: 4 to 10 years of experience, $N = 67$; and Group 3: 11 or more years of experience, $N = 101$); and years of experience working in the QSM district (Group 1: 3 years or less of experience, $N = 101$; Group 2: 4 to 10 years of experience, $N = 71$; and Group 3: 11 or more years of experience, $N = 40$). The last comparisons done using the mixed-between groups design were for the teacher participant group, by years of education experience (Group 1: 3 years or less of experience, $N = 32$; Group 2: 4 to 10 years of experience, $N = 49$; and Group 3: 11 or more years of experience, $N = 51$) and by years of work experience in the QSM district (Group 1: 3 years or less of experience in QSM district, $N = 71$; Group 2: 4 to 10 years of experience in QSM district, $N = 47$; and Group 3: 11 or more years of experience in QSM district, $N = 14$).

Also of interest was whether there were significant differences between the belief and practice factor responses for respondents by school district. The cohort determined at the start of the project in agreement with the participating districts while soliciting participation, that the districts were unique and not to be compared. Accordingly, I used paired-samples *t*-tests to answer this question with the individual district demographic as the independent variable (Bering Strait School District, $N = 125$; Kuspuk School District, $N = 49$; and Lake and Peninsula School District, $N = 38$) and knowledge factor belief and practice scales as the dependent variables.

4.5.3 Difference Analyses by Job Classification

For the demographic of job classification, a mixed between-within subjects analysis of variance was conducted to assess the impact of job classification (administrator, teacher, or classified staff) on participants' score on the Quality Schools Model Implementation Questionnaire, across the two scales (beliefs and practice). Before looking at the main effects for the groups, Wilks's lambda was calculated to assess any interaction effect between job classification and the belief and practice score variables. A significant Wilks's lambda score means that the impact of one variable is influenced by the level of the second variable, rendering main effect interpretations suspect. No significant interaction effect was found between job classification and the belief/practice factor variables at $p < .05$ and $df(2, 209)$, as shown in Table 4.27.

Table 4.27 Results of Wilks's Lambda Test for Interaction Effects for Analysis by Job Classification * Knowledge Subscales

Factor	Wilks's lambda	*F*	*p*	Partial eta squared
Analysis and Use	.989	1.171	.312	.011
Knowledge Creation	.974	2.844	.060	.026
Knowledge Availability	.993	.749	.474	.007
Org. Knowledge Use	.983	1.789	.107	.017

After determining that the interaction effect was not significant, I checked Levene's test of equality of error variances to ensure that the assumption of

homogeneity of variances was met; the significance values for all variables were non significant, meaning they were > .05. Last, Box's test of equality of covariance matrices was examined for significance values > .001. All variables met this assumption as well, so analysis proceeded to assess the main effect of job classification on belief and practice score differences within groups. There were significant within-subjects effects for job classification on the difference between belief and practice scores, $df(1, 209)$, $p < .05$. The practice scores were lower than belief scores for all three job classification groups. All of the partial eta^2 values were large, meaning the significant differences were important. The main effect statistics are summarized in Table 4.28.

Table 4.28 Summary of Main Effect of Job Classification on Difference between Belief and Practice Scores within Subjects

Factor	Wilks's lambda	*F*	*p*	Partial eta squared
Analysis and Use	.688	94.660	*	.312
Knowledge Creation	.614	131.469	*	.386
Knowledge Availability	.661	107.299	*	.339
Org. Knowledge Use	.514	197.587	*	.486

*$p < .05$

The next step of the analysis looked at differences in belief and practice scores between job classification groups $df(2, 209)$ and $p < .05$. Table 4.29 shows the mean difference scores for the three groups. Post-hoc tests using the Tukey HSD test showed significant differences in the mean score differences between groups.

The differences between belief and practice scale scores for administrators were significantly different than those for both teachers and classified staff for the subscales of Knowledge Analysis and Use, Knowledge Creation, and Knowledge Availability. For the factor of Organizational Knowledge Use, the significant difference was between administrators and teachers; for that factor, the slope of the difference for classified staff was similar to that for administrators. For all four knowledge subscales, the slope of the line between belief and practice scores showed that administrators had higher belief as well as practice scores than did either teachers or classified staff. For each factor, the results were moderately important shown by the partial eta^2 values.

Table 4.29 Summary of Between-Group Effect of Job Classification on Belief and Practice Difference Scores

Factor Group	Mean diff.	*F*	*p*	Partial eta squared
Analysis and Use		7.230	.001	.065
Administrator—Teacher	**.310***		.002	
Administrator—Classified	**.360***		.002	
Knowledge Creation		6.117	.003	.055
Administrator—Teacher	**.288***		.002	
Administrator—Classified	**.258***		.027	
Knowledge Availability		5.475	.005	.050
Administrator—Teacher	**.279***		.003	
Administrator—Classified	**.242***		.046	
Org. Knowledge Use		5.102	.007	.047
Administrator—Teacher	**.299***		.005	

*$p < .5$

4.5.4 Difference Analyses by Years of Education Experience

The next comparison for Research Question 3 was a within- and between-group analysis of difference in mean belief and practice scores for groups based on years of education experience, using a mixed between-within ANOVA. The values for Box's test of equality of covariance matrices were all $p > .001$, showing non significance, and the values for Levene's test of equality of error variance were $p > .05$ for all four subscales; therefore, no assumptions were violated. There were no significant within-subjects effects for years of experience on the difference between belief and practice scores, $df(2, 209)$, $p < .05$. The interaction effect statistics are summarized in Table 4.30.

Table 4.30 Summary of Interaction Effect of Years of Experience on Difference between Belief and Practice Scores within Subjects

***N* = 212**

Factor	Wilks's lambda	*F*	*p*	Partial eta squared
Analysis and Use	.998	.231	.794	.002
Knowledge Creation	.986	1.486	.229	.014
Knowledge Availability	.989	1.197	.304	.011
Org. Knowledge Use	.997	.305	.737	.003

However, there was a substantial significant main effect for the difference between belief and practice mean scores $df(1,209)$ and $p < .05$, with all three groups showing lower practice mean scores. For the subscales of Knowledge Creation and

Organizational Knowledge Use, the partial eta^2 values show that the findings were moderately important. The summary of the main effect results is shown in Table 4.31

Table 4.31 Summary of Main Effect of Years of Experience on Difference between Belief and Practice Scores within Participants

***N* = 212**

Factor	Wilks's lambda	*F*	*p*	Partial eta squared
Analysis and Use	.608	134.531	*	.392
Knowledge Creation	.503	206.785	*	.497
Knowledge Availability	.580	151.271	*	.011
Org. Knowledge Use	.432	274.930	*	.568

*$p < .5$

Though there was a significant difference between the mean belief and practice scores for each education experience group, the differences compared between groups *df* (2,209), $p < .05$ was not significant, suggesting that years of education experience did not have an effect on the difference between belief and practice scores: Knowledge Analysis and Use, $F = .319$, $p = .727$, partial eta squared = .003; Knowledge Creation, $F = .664$, $p = .516$, partial eta squared = .006; Knowledge Availability, $F = .430$, $p = .651$, partial eta squared = .004; and Organizational Knowledge Use, $F = 1.280$, $p = .280$, partial eta squared = .012.

4.5.5 Difference Analyses by Years of District Work Experience

The third comparison for Research Question 3 was a within- and between-group analysis of difference in mean belief and practice scores for groups based on

years of experience working in a district that had adopted the QSM (Group 1: 3 years or less of QSM district experience; Group 2: 4 to 10 years of QSM district experience; and Group 3: 11 years or more of QSM district experience), conducted using a mixed between-within ANOVA. The values for Box's test of equality of covariance matrices were all $p > .001$, showing non significance, and the values for Levene's test of equality of error variance were $p > .05$ for all four subscales; therefore, no assumptions were violated. There were no significant within-subjects interaction effects for years of experience working in the QSM district on the difference between belief and practice scores, $df(2, 209)$, $p < .05$. The interaction effect statistics are summarized in Table 4.32.

Table 4.32 Summary of Interaction Effect of Years of Experience Working in the QSM District on Difference between Belief and Practice Scores within Subjects
***N* = 212**

Factor	Wilks's lambda	*F*	*p*	Partial eta squared
Analysis and Use	.994	.615	.542	.006
Knowledge Creation	.987	1.406	.247	.013
Knowledge Availability	.996	.418	.659	.004
Org. Knowledge Use	.999	.071	.932	.001

However, there was a substantial significant main effect for the difference between belief and practice mean scores $df(1,209)$ and $p < .05$, with all three groups of QSM

experience showing lower practice scale mean scores. A summary of the main effect test results is shown in Table 4.33.

Table 4.33 Summary of Main Effect of Years of Experience Working in the QSM District on Difference between Belief and Practice Scores within Participants

***N* = 212**

Factor	Wilks's lambda	*F*	*p*	Partial eta squared
Analysis and Use	.640	117.441	*	.360
Knowledge Creation	.548	172.400	*	.452
Knowledge Availability	.610	135.545	*	.390
Org. Knowledge Use	.446	259.353	*	.554

*$p < .05$

Though there was a significant difference between the mean belief and practice scores for each QSM district experience group, the differences compared between groups $df(2,209)$, $p < .05$ were not significant, suggesting that like years of education experience, years of experience working in a district that had adopted the QSM did not have an effect on the difference between belief and practice scores: Knowledge Analysis and Use, $F = .782$, $p = .459$, partial eta squared = .007; Knowledge Creation, $F = .236$, $p = .790$, partial eta squared = .002; Knowledge Availability, $F = .274$, $p = .760$, partial eta squared = .003; and Organizational Knowledge Use, $F = .937$, $p = .393$, partial eta squared = .009.

4.5.6 Difference Analyses for the Teacher Group by Years of Education Experience

The largest research participant group was teachers ($N = 132$). To test for differences between belief and practice scores based on years of experience and for differences between belief and practice scores based on years of experience working in a QSM district, the teacher group was divided into three groups: Group 1, 3 years or less of experience ($N = 32$); Group 2, 4 to 10 years of experience ($N = 49$); and Group 3, 11 or more years of experience ($N = 51$). An analysis of the difference in mean belief and practice scores for teacher groups based on years of education experience was conducted using a mixed between-within ANOVA. The values for Box's test of equality of covariance matrices were all $p > .001$, showing non significance, and the values for Levene's test of equality of error variance were $p > .05$ for all four subscales; therefore, no assumptions were violated. There were no significant within-subjects effects for years of experience on the difference between belief and practice scores, $df(2, 129)$, $p < .05$. The interaction effect statistics are summarized in Table 4.34.

Table 4.34 Summary of Interaction Effect of Years of Experience on Difference between Belief and Practice Scores within Subjects

***N* = 132**

Factor	Wilks's lambda	*F*	*p*	Partial eta squared
Analysis and Use	.999	.093	.912	.001
Knowledge Creation	.997	.167	.847	.003
Knowledge Availability	.994	.385	.681	.006
Org. Knowledge Use	.999	.054	.948	.001

$p < .05$

Similar to the results for the whole participant population, there was a substantial significant main effect for the difference between belief and practice mean scores $df(1,129)$ and $p < .05$, with all three teacher groups based on education experience showing a reduction in practice mean scores. A summary of the main effect test results is shown in Table 4.35.

Table 4.35 Summary of Main Effect of Years of Experience on Difference between Belief and Practice Scores for Teachers

***N* = 132**

Factor	Wilks's lambda	*F*	*p*	Partial eta squared
Analysis and Use	.583	92.101	*	.417
Knowledge Creation	.446	160.533	*	.554
Knowledge Availability	.553	104.427	*	.447
Org. Knowledge Use	.367	222.033	*	.633

*$p < .05$

For the Organizational Knowledge Use factor, a significant difference was found between teachers with 4 to 10 years of experience and teachers with 11 or more years of education experience F (2,129) = 4.302, p = .016, partial eta squared = .063 (M difference = .276, SE = .098). Though there was a significant difference between the mean belief and practice scores within each of the teacher education experience groups for the other three knowledge subscales, the differences compared between groups df (2,129), $p < .05$ was not significant, similar to the results for the larger participant group based on education experience, suggesting that for the other three subscales, years of education experience was not the reason for the difference between belief and practice scores: Knowledge Analysis and Use, F = 3.013, p = .053, partial eta squared = .045; Knowledge Creation, F = .929, p =.397, partial eta squared = .014; and Knowledge Availability, F = 1.819, p =.166, partial eta squared = .027.

4.5.7 Difference Analyses for the Teacher Group by Years of Experience in the Current District

The mixed between-within analysis of variance for the teacher group to examine the effect of years of QSM district work experience on the difference between belief and practice scale responses concluded similarly to the previous test with the whole study population (N = 212) that there was a significant main effect for the difference between belief and practice scores for the subscales: Knowledge Analysis and Use, Wilks's lambda = .714, F (1, 129) = 41.791, p = <.05, partial eta = .286; Knowledge Creation, Wilks's lambda = .592, F (1, 129) = 88.751, p = <.05, partial eta = .408; Knowledge Availability, Wilks's lambda = .687, F (1, 129) = 61.392, p = <.05, partial eta = .322; and Organizational Knowledge Use, Wilks's

lambda = .477, F (1, 129) = 141.282, p = <.05, partial eta = .523. The main effect of difference in belief and practice scores was not significant across teacher groups formed based on years of experience working in a QSM district.

4.5.8 District Level Differences in Belief and Practice Scores

To determine whether the pattern of higher belief scores and lower practice scores existed within the participant districts as well, paired-samples *t*-tests were used. The intent of the analysis was to determine whether a statistically significant difference existed for each district without comparing districts; therefore, the results for each district for the four knowledge subscales are summarized separately. No statistically significant comparisons between districts can be or should be drawn from comparing the individual district data presented here. For paired-samples *t*-tests, the basic assumptions of skewness and kurtosis apply; these were checked previously. One additional assumption is that the difference between the two scores obtained for each subject should be normally distributed, but with a sample size of at least 30, violation of this assumption is not likely to cause any serious problems (Pallant, 2007, p. 238). While the sample size for two districts was fairly small, all three were > 30.

Based on the paired-sample *t* test for participants from Lake and Peninsula School District (N = 38), there were statistically significant decreases in the QSM Questionnaire scores from the belief scale to the practice scale for all four knowledge subscales, shown in Table 4.36. The eta squared values are large, showing that the results of the *t* test have a high degree of importance.

Table 4.36 Summary of Paired-Samples *t*-test for Belief and Practice Knowledge Subscales for Lake and Peninsula School District

Factor	Belief *M*	*SD*	Practice *M*	*SD*	Diff. *M*	*t*	*df*	*p*	Eta squared
Knowledge Analysis	3.428	.390	2.776	.672	.651	5.668	37	*	.46
Knowledge Creation	3.379	.377	2.652	.557	.726	8.274	37	*	.65
Knowledge Availability	3.50	.376	2.736	.631	.763	7.241	37	*	.58
Organizational Knowledge Use	3.388	.453	2.381	.687	1.00	8.820	37	*	.68

*$p < .05$

In the paired-samples *t*-test for participants from Kuspuk School District ($N = 49$), there were statistically significant decreases in the QSM Questionnaire scores from the belief scale to the practice scale for all four knowledge subscales, as shown in Table 4.37. The eta squared values are large, showing the importance of these results.

Table 4.37 Summary of Paired Samples *t* -test for Belief and Practice Knowledge Subscales for Kuspuk School District

Factor	Belief *M*	*SD*	Practice *M*	*SD*	Diff. *M*	*t*	*df*	*p*	eta^2
Knowledge Analysis	3.301	.544	2.770	.612	.530	6.573	48	*	.47
Knowledge Creation	3.330	.480	2.689	.584	.640	7.006	48	*	.51
Knowledge Availability	3.367	.593	2.653	.558	.714	8.871	48	*	.62
Organizational Knowledge Use	3.244	.600	2.418	.613	.826	8.376	48	*	.59

*$p < .05$

The paired-samples *t*-test for participants from Bering Strait School District ($N = 125$) also showed that there were statistically significant decreases in the QSM Questionnaire scores from the belief scale to the practice scale for all four knowledge subscales, as summarized in Table 4.38. All of the eta squared values are large, showing the importance of these results.

Table 4.38 Summary of Paired-Samples *t* -test for Belief and Practice Knowledge Subscales for Bering Strait School District

Factor	Belief *M*	*SD*	Practice *M*	*SD*	Diff. *M*	*t*	*df*	*p*	eta^2
Knowledge Analysis	3.434	.472	3.040	.610	.394	8.667	124	*	.38
Knowledge Creation	3.435	.471	2.916	.608	.518	10.425	124	*	.47
Knowledge Availability	3.552	.410	3.210	.537	.342	7.733	124	*	.39
Organizational Knowledge Use	3.432	.493	2.754	.660	.678	13.009	124	*	.58

*$p < .05$

4.6 Analysis for Research Question 4

4.6.1 Research Question 4 and Hypotheses

Research Question 4 sought to discover the relationships among the Baldrige in Education Criteria that describe the QSM, using the Baldrige in Education theoretical model as a starting point. The hypothesis for this research question is that knowledge management has either a direct or an indirect effect on all other Baldrige criteria as shown in the Baldrige theoretical model. While Research Questions 1, 2, and 3 are unique to this researcher, some variation of Research Question 4 was shared by the four members of the research cohort, who all had an interest in the overall structural model for the QSM data.

4.6.2 Tests for Assumptions

All indicator variables for each of the Baldrige-related latent factors were assessed for univariate normality and the presence of outliers. Because the tests for assumptions for the knowledge variables and subscales were described earlier in relationship to Research Questions 1 through 3, the description in this section is focused on the other variables necessary to create the structural model. The results of the assumptions tests for the remaining variables from the questionnaire were as follows: For the Staff Focus factor, 10 of the 11 variables had a slight negative skew toward *agree* and *strongly agree*, the value of which did not exceed .09 for any variable. No items had outliers. For the factor of Strategic Planning, the skewness value did not exceed 1.0 for any variable, though six of the eight had a slight negative skew. Items 24 and 45 had outliers with differences between the 5% trimmed mean and the original means of .04 and .05, respectively. All skew and kurtosis values for the factor of Student, Stakeholder, and Market Focus were within the range of + / - 1.0. Item 15 had an outlier and a difference of only .04 between the 5% trimmed mean and the original mean. For the factor of Leadership, 11 of 12 variables had a slight negative skew, the value of which did not exceed +/- 1.0 for any variable. Outlier scores were found for seven variables (items 2, 8, 31, 39, 42, 63, and 72). The greatest difference between the 5% trimmed mean and the original mean for these variables was .05. No outliers were removed due to their lack of effect on the mean scores. Eight of the 11 variables in the Process Management factor had slight negative skews, all of which were less than + / - 1.0. There were no outliers for any variable. For

Results, all skew values for the variables were within the + / - 1.0. Five of the nine variables had a slight positive skew toward the *disagree* and *strongly disagree* response options. Item 5 had two outlier scores and a difference between the 5% trimmed mean and the original mean of only .04. Item 64 had one outlier score and a difference between the two means of .05. None of the variables showed evidence of non normality (skewness > 3.0; kurtosis > 2.0), nor was the effect of outlier scores on means significant.

Next, Mahalanobis distance was used to check for multivariate normality where χ^2 for each variable to be included was compared against a table of critical values. The Mahalanobis test was run in AMOS for the full set of 72 variables and for the indicator variables grouped with their latent factor. Tabachnick and Fidell (2007) provided the table of values; for 72 variables, the critical value of χ^2 is 112.317 (p. 949). They recommended a conservative significance value, $p < .001$. All of the items from the practice scale from the QSM Questionnaire had acceptable χ^2 values when checked for multivariate normality, so this assumption was also met.

4.6.3 The Hypothesized Model and Confirmatory Factor Analysis

We hypothesized a seven-factor model based on the Baldrige in Education measurement constructs where all seven factors would covary, shown by recursive arrows. While our initial choice as a research cohort was to include all variables in the measurement model, that number of parameters would have led to an inadmissible solution based on the number of cases in our data set. J. Schreiber et al. (2006) advised,

> The validity of the final results of the structural model is dependent on capturing and establishing the reliability of the underlying constructs. The power of SEM is seen most fully when multiple indicators for each latent variable are first tested through CFA to establish the conceptual soundness of latent variables used in the final structural model. (p. 335)

Working as a cohort and based on our understanding of theory and the related research, we reduced the number of variables from the questionnaire to 55 from 72. Table 4.39 shows the variables retained for each factor. Next we reran the CFAs for each individual factor to obtain information about the suitability of each variable for inclusion in the QSM measurement and structural models. The results of the 7 individual factor CFAs are in Appendix F.

Table 4.39 Questionnaire Items Evaluated for QSM Structural Model

Factor	Survey questions
Leadership	8, 39, 42, 47, 49, 31, 63, 66, 72
Strategic Planning	16, 34, 38, 45, 53, 54, 56
Knowledge Management	7, 20, 22, 25, 40, 52, 57, 59
Process Management	6,10, 12, 18, 21, 41, 58, 61
Staff Focus	4, 9, 14, 50, 51, 55, 65, 68
Student, Stakeholder, and Market Focus	1, 13, 15, 23, 35, 36, 37, 67
Results	5, 19, 26, 43, 64, 69, 70

We examined the CFA results to trim the number of variables down to 28 observed variables for use in achieving an acceptable fit model, following the advice of Bryant and Yarnold (1995),

> In deciding which factor loadings to include in a CFA model, researchers seek to develop parsimonious models in which individual items load on as few factors as necessary to reasonably fit the data. In this way, they balance their desire to explain variance in subject responses with their desire for conceptual parsimony. (p. 115)

Both Tabachnick and Fidell (2007, p. 710) and Garson (n.d.) provide guidance to determine the minimum number of variables that may be retained to create a measurement model. We retained four variables with the highest standardized regression weights and squared multiple regression scores for each factor. Cronbach's alpha for the four measurement variables within each latent variable are shown in Table 4.40. All of the alpha scores were > .70, the commonly accepted minimum for reliability of a scale.

Table 4.40 Cronbach's Alpha for Variable Subsets used for QSM CFA

Factor	Cronbach's Alpha
Leadership	.85
Strategic Planning	.80
Knowledge Management	.82
Process Management	.84
Staff Focus	.77
Student, Stakeholder, and Market Focus	.79
Results	.75

The second-order CFA model for the QSM data followed model conventions with ovals representing latent variables and rectangles representing the measured variables. The seven first-order latent endogenous variables fully explain the second-order latent exogenous variable of Baldrige in Education using the Quality Schools Model questionnaire items from the practice scale. In the CFA, the latent variables were uncorrelated to free some parameters, shown by the change from curved lines to straight directional lines. J. Schreiber et al. called this process of model fitting in CFA and SEM "iterative processes by which modifications are indicated in the initial results, and parameter constraints altered to improve the fit of the model" (p. 335). The second-order CFA measurement model for the QSM data is recursive with 28 observed and 43 unobserved variables. There are 36 exogenous variables and 35 endogenous variables, shown in Figure 4.4.

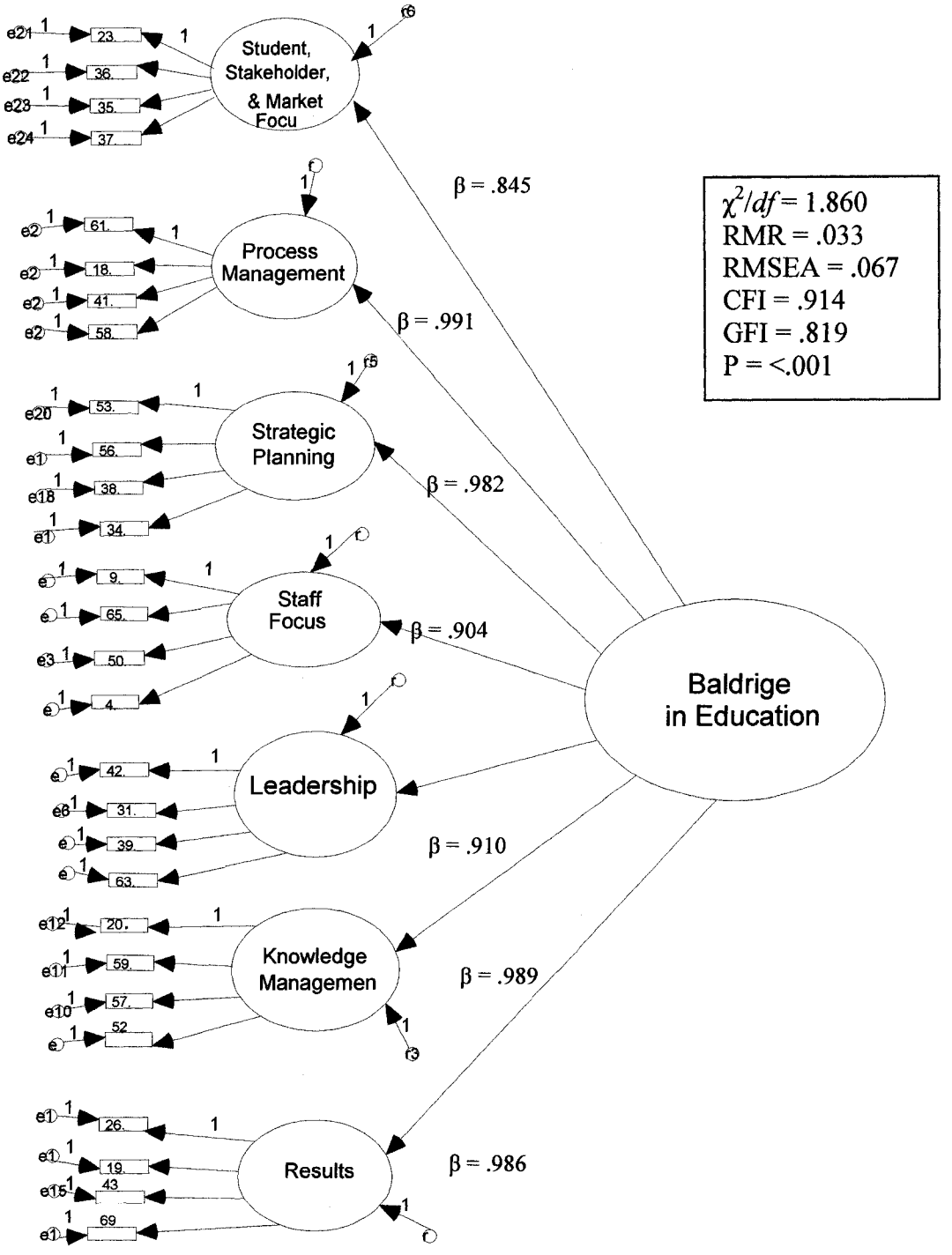

Figure 4.4 Second Order CFA for Quality Schools Model Practice Scale

Table 4.41 shows the unstandardized and standardized regression estimates for the second-order CFA model of the QSM data.

Table 4.41 Maximum-Likelihood Parameter Estimates of the Acceptable Fit Quality Schools Model CFA

			B	*SE*	*p*	β
Student, Stakeholder, and Market Focus	<---	Baldrige in Education	.857	2370.420	***	.845
Process Management	<---	Baldrige in Education	.868	2402.413	***	.991
Strategic Planning	<---	Baldrige in Education	.888	2457.200	***	.982
Staff Focus	<---	Baldrige in Education	.815	2253.672	***	.904
Leadership	<---	Baldrige in Education	.880	2433.504	***	.910
Knowledge Management	<---	Baldrige in Education	.898	2485.084	***	.989
Results	<---	Baldrige in Education	.679	1879.572	***	.986
61	<---	Process Management	1.000		***	.700
18	<---	Process Management	1.156	.106	***	.792
41	<---	Process Management	1.033	.103	***	.723
58	<---	Process Management	1.106	.104	***	.769
4	<---	Staff Focus	.877	.112	***	.597
50	<---	Staff Focus	1.015	.115	***	.689
65	<---	Staff Focus	1.047	.113	***	.726
34	<---	Strategic Planning	.805	.086	***	.638
63	<---	Leadership	.956	.084	***	.759
59	<---	Knowledge Management	.916	.090	***	.687
23	<---	Student, Stakeholder, and Market Focus	.886	.102		.646
69	<---	Results	1.109	.163		.562
43	<---	Results	1.442	.175		.746
19	<---	Results	1.388	.169	***	.747
57	<---	Knowledge Management	1.127	.097	***	.770
20	<---	Knowledge Management	1.010	.096	***	.712
39	<---	Leadership	.978	.083	***	.779
31	<---	Leadership	1.037	.090		.772
42	<---	Leadership	1.000			.771
9	<---	Staff Focus	1.000			.681
53	<---	Strategic Planning	1.000		***	.756
38	<---	Strategic Planning	.981	.093	***	.716
56	<---	Strategic Planning	1.034	.098	***	.709
37	<---	Student, Stakeholder, and Market Focus	.876	.085	***	.724
35	<---	Student, Stakeholder, and Market Focus	.867	.088	***	.696
36	<---	Student, Stakeholder, and Market Focus	1.000		***	.766
26	<---	Results	1.000		***	.566
52	<---	Knowledge Management	1.000		***	.750

*** Significant probability at .01

Squared multiple correlation values are shown in Table 4.42. All indicator variables measured their corresponding latent variables moderately to very well with small to moderate covariance.

Table 4.42 Squared Multiple Correlations for the Second-Order Quality Schools Model CFA

Variable	R^2
Strategic Planning	.963
Student, Stakeholder, and Market Focus	.714
Staff Focus	.818
Knowledge Management	.979
Process Management	.983
Results	.972
26	.320
19	.558
52	.562
9	.464
34	.407
38	.513
56	.503
53	.571
23	.417
36	.587
65	.527
58	.591
41	.523
43	.557
69	.316
20	.507
39	.606
42	.594
63	.576
18	.627
61	.490
57	.593
59	.472

Table 4.42, continued

Variable	R^2
31	.595
37	.524
50	.475
4	.356
35	.484

4.6.4 Fitting the Structural Model

After determining which measurement variables to include for each of the seven assumed a priori latent variables the structural model was drawn, showing linkages supported by the theoretical literature and based on the findings of other researchers. The Baldrige theoretical model hypothesizes and some researchers have found Leadership to have a direct effect on four latent variables: Knowledge Management, Strategic Planning, Staff Focus, and Process Management. In the QSM structural model, the parameter values for the individual measurement variables were fixed to the values obtained in the individual factor CFAs to reduce the number of parameters being measured, as described in Garson (n.d.) and Edwin (2007, p. 102). None of the error variances were allowed to correlate. Correlated error terms are an indication that one or more relevant exogenous variables may have been omitted from the model (James, Mulaik, & Brett, 1982). Incorporation of all four causal paths from Leadership to the four systems variables produced an unacceptable fit for the model, so the paths were then tested one by one to achieve an acceptable fit. The acceptable fit structural model for the QSM data, with two significant paths from Leadership is shown in Figure 4.5. All except one of the paths (Leadership to Strategic Planning)

shown in the structural model are significant. Winn's (1996) description of the parts of his model seem appropriate to the Quality Schools structural model as well: The leadership and staff focus variables represent actors within the organization, while strategic planning and knowledge management could be considered preparatory organizational activities. Process management is the organizational action associated with the outcomes of student, stakeholder and market focus, and results. Model fit indices show that this is a good model of the relationships between the latent variables derived from the QSM data.

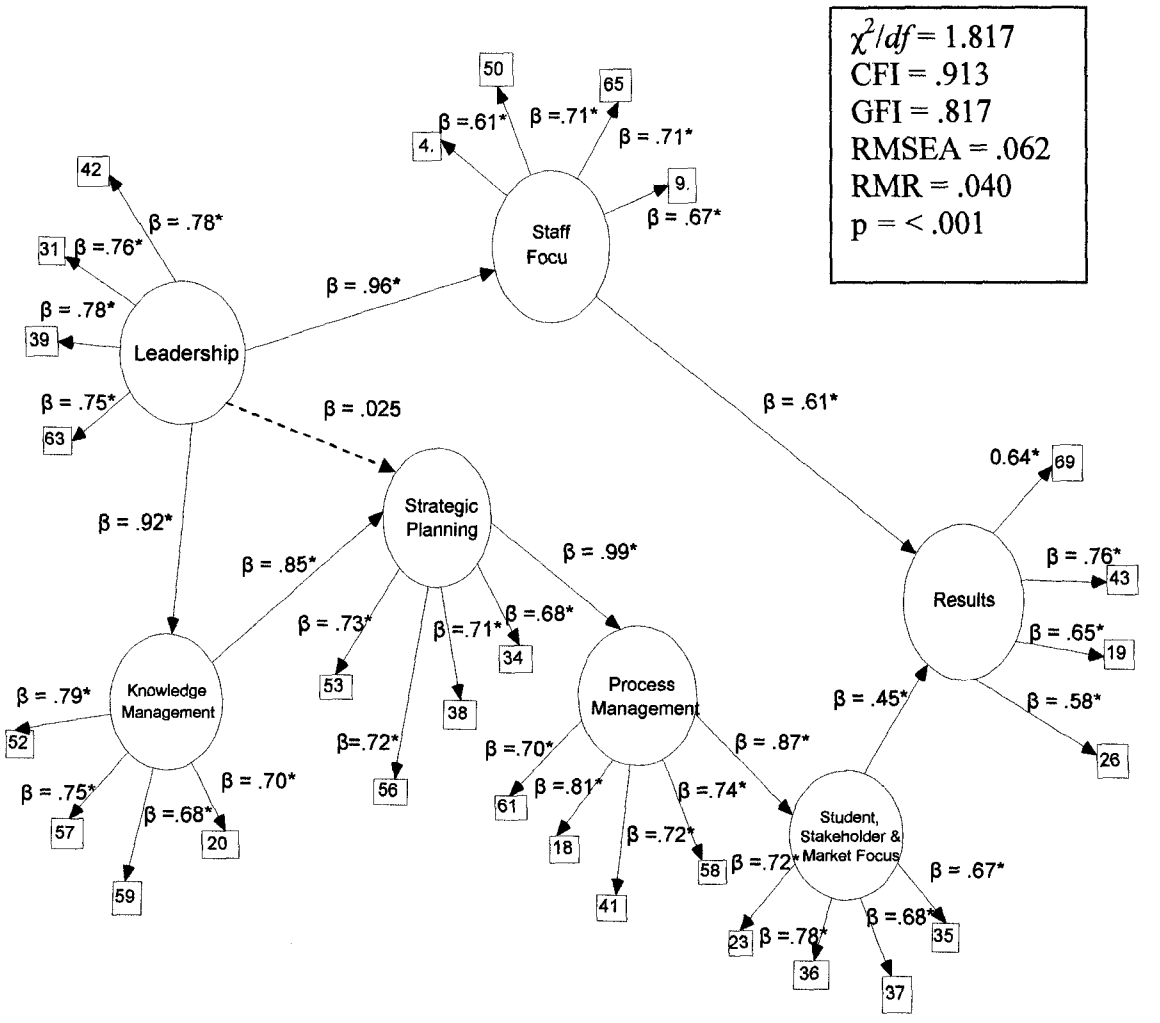

Figure 4.5 Structural Model for the QSM Using Baldrige in Education Measurement Criteria

The QSM structural model in Figure 4.5 shows Leadership as the only exogenous latent variable in the structural model for the QSM data, and the only latent variable with an effect on all other latent variables. Leadership has a direct effect on Knowledge Management and on Staff Focus. Additionally, Leadership has a strong

indirect effect (.944) on Results through the mediating variables of Staff Focus, and the path from Knowledge Management through Strategic Planning to Process Management to Student, Stakeholder, and Market Focus; on Strategic Planning (.896) through Knowledge Management as a mediating variable; on Process Management through the mediating variables of Knowledge Management and Strategic Planning (.914); and on Student, Stakeholder, and Market Focus through the mediating variables of Knowledge Management, Strategic Planning, and Process Management (.795). Four endogenous variables have a direct effect on other endogenous variables: Knowledge Management on Strategic Planning; Strategic Planning on Process Management; Staff Focus on Results; and Process Management on Student, Stakeholder, and Market Focus. Knowledge Management also has an indirect effect on Process Management through the mediating variable of Strategic Planning (.967), an indirect effect on Student, Stakeholder, and Market Focus through Strategic Planning and Process Management (.840), and an indirect effect on Results through Strategic Planning, Process Management, and Student, Stakeholder and Market Focus (.377). The indirect effect of Strategic Planning on Student, Stakeholder, and Market Focus through Process Management is .862. All six other factors influence Results in the Quality Schools Model, and four latent variables (Leadership, Knowledge Management, Strategic Planning, and Process Management) affect the other latent variable (outcome) of Student, Stakeholder, and Market Focus. Knowledge Management is the second most influential variable in the model and sets into motion the actions that achieve the results of QSM reform model, with a total effect on two

other latent variables that are also systems factors, and both of the variables that are outcomes in the Baldrige model. Staff Focus has an effect on just one other variable, Results.

Table 4.43 presents the standardized loadings for the variables and factors, which can be used as an indicator of reliability that the items measure the construct they are intended to measure. All of the regression values are moderate (at least 0.5), with most above the 0.7 acceptable threshold for good reliability.

Table 4.43 Maximum-Likelihood Parameter Estimates of the QSM Structural Model

				B	*SE*	*p*	β
Knowledge Management	<---	Leadership		.938	.056	***	.920
Strategic Planning	<---	Leadership		.025	.203	.903	.025
Strategic Planning	<---	Knowledge Management		.937	.207	***	.975
Process Management	<---	Strategic Planning		1.048	.052	***	.992
Student, Stakeholder, & Market Focus	<---	Process Management		.872	.060	***	.869
Staff Focus	<---	Leadership		1.011	.058	***	.961
Results	<---	Staff Focus		.618	.122	***	.611
Results	<---	Student, Stakeholder, & Market Focus		.459	.129	***	.449
69	<---	Results		.640			.595
19	<---	Results		.650			.694
39	<---	Leadership		.780			.772
43	<---	Results		.760			.745
61	<---	Process Management		.700			.710
18	<---	Process Management		.810			.791
26	<---	Results		.580			.603
31	<---	Leadership		.760			.734
42	<---	Leadership		.780			.759
63	<---	Leadership		.750			.762
20	<---	Knowledge Management		.700			.690
59	<---	Knowledge Management		.680			.698
52	<---	Knowledge Management		.790			.782
57	<---	Knowledge Management		.750			.736

Table 4.43, continued

			B	*SE*	*p*	β
50	<---	Staff Focus	.710			.686
9	<---	Staff Focus	.670			.660
65	<---	Staff Focus	.710			.706
4	<---	Staff Focus	.610			.593
36	<---	Student, Stakeholder, & Market Focus	.780			.746
23	<---	Student, Stakeholder, & Market Focus	.717			.657
37	<---	Student, Stakeholder, & Market Focus	.680			.709
35	<---	Student, Stakeholder, & Market Focus	.670			.679
41	<---	Process Management	.720			.728
58	<---	Process Management	.740			.764
34	<---	Strategic Planning	.680			.677
38	<---	Strategic Planning	.710			.698
56	<---	Strategic Planning	.720			.676
53	<---	Strategic Planning	.730			.742

*** Significant probability at .01

Table 4.44 Squared Multiple Correlations for the QSM Structural Model

Factor or variable	R^2
Knowledge Management	.846
Strategic Planning	.996
Process Management	.984
Staff Focus	.924
Student, Stakeholder, and Market Focus	.756
Results	.995
53	.550
56	.457
38	.487
34	.458
58	.584
41	.529
23	.432
36	.557
65	.499
9	.435
52	.611

Table 4.44, continued

Factor or variable	R^2
20	.477
43	.576
26	.363
63	.581
18	.625
61	.503
43	.555
57	.542
59	.487
31	.539
37	.503
39	.596
50	.471
4	.352
19	.481
69	.354
35	.461

The standardized residual covariances for the QSM structural model are presented in Table 4.45. Three of the Strategic Planning variables have an absolute standardized residual covariance value > 2 but they are randomly attached to other variables measuring different endogenous factors. Since all other fit indices show acceptable values, the three standardized residual covariances > 2 are noted but accepted.

Table 4.45 Standardized Residual Covariances for the QSM Structural Model

Variable	53	56	38	34	58	41	23	36	65	9	52
53	.215										
56	.864	.618									
38	-.417	.139	.254								
34	-.118	.529	.139	-1.146							
58	.051	1.308	.250	-.534	.498						
41	.191	-.213	-.662	-.933	.122	-.111					
23	-.132	.599	.493	-.887	1.117	.763	.000				
36	.224	.332	1.035	.247	.524	-1.016	-.230	-.151			
65	.092	.390	1.488	-.341	.621	-.773	.644	-1.119	.037		
9	-.212	-.052	1.123	-.620	-1.030	.096	.993	-1.656	.778	.170	
52	-.420	.809	-.602	-1.393	.095	.001	-.744	-1.174	-.935	-.436	-.852
20	.233	-.460	-.250	-1.496	-.079	.185	1.105	-.849	1.172	.815	-.562
43	.155	-.718	.477	-.458	-.704	2.103	-.015	-.608	-.763	-.548	-.910
26	-.386	.076	-.156	-.717	-.508	-.209	.338	-1.037	-.992	-.717	-1.506
63	.123	-.079	-.694	-1.269	-1.087	.061	.773	-1.704	.270	1.515	-.444
18	-.821	-.317	-.060	-2.084	.317	-.034	.691	-1.374	.496	.493	-.992
61	.306	.532	.235	-.856	.393	.007	-.073	-1.858	.032	.013	.123
43	.961	1.299	.339	-.925	.032	.967	.524	-1.417	-.245	-.437	-.298
57	.638	1.434	.928	-1.108	1.192	.012	1.192	.266	.246	.247	.194
59	.633	.282	-.023	-1.457	.724	-.474	-1.266	-1.674	.815	.250	-.557
31	.707	.305	.658	-1.239	.025	-.039	1.375	.577	-.406	-.722	-.516
37	-.208	.739	2.234	.640	.849	-1.303	-.638	.941	.309	.488	-.977

Table 4.45, continued

Variable	20	43	26	63	18	61	43	57	59	31	37
20	.294										
43	.700	-.141									
26	.874	-.801	-.678								
63	1.101	.111	-.089	.168							
18	1.141	-.104	.332	.124	-.361						
61	.253	-.844	-.307	.076	-.359	.001					
43	-.123	.577	-.689	.057	-.109	-.049	.007				
57	.716	-.772	-.344	-.668	.046	1.209	1.229	.871			
59	-.088	-.038	-1.531	.251	-.094	.591	.104	.748	-.141		
31	2.079	.312	.317	.341	1.040	.564	.708	1.206	-.330	.465	
37	-1.181	-.559	-.731	-.582	-.877	-.678	.472	1.898	-.646	.523	.087
39	.658	.354	-.331	.020	-.566	-1.257	-.919	-.498	-.635	.373	.493
50	.202	.319	-.992	.460	-.030	-.445	-.155	.124	-.867	.192	.436
4	1.735	-.880	-.683	.362	.269	-.282	.506	1.645	-.477	.063	.615
19	2.177	-.310	-.201	.200	2.614	.721	.225	2.089	.747	.929	.980
69	-.031	-1.043	-.530	-1.090	-1.125	-.705	.741	1.122	-1.370	.194	-1.029
35	-.321	.261	-.807	-.905	-.125	-.722	-.661	.972	-.228	1.765	-.321

Table 4.45, continued

Variable	39	50	4	19	69	35
39	-.435					
50	-1.032	-.151				
4	-.868	-.480	-.059			
19	.112	-.084	.613	.991		
69	-.392	-1.096	.101	-.462	-.642	
35	-.165	.348	-.238	.787	-1.196	.089

Based on theory and the research of others I hypothesized that Knowledge Management would have a direct effect on all of the other systems variables. In both 1988 and 1997, the Baldrige models showed Knowledge Management as well as Leadership as drivers of the theoretical model. The 2006 Baldrige theoretical model showed Knowledge Management undergirding the model and affecting all other

factors. Wilson and Collier (2000) found that Knowledge Management was the second most important Baldrige category. None of the modifications I tried for the QSM data set would allow for additional causal paths within the model so while it was possible to show significant causal paths to Staff Focus shared by Leadership and Knowledge Management for instance, with a slight positive change to the chi squared statistic, it meant other paths had to be eliminated. Therefore, the hypothesis that Knowledge Management affects all other systems factors in the Quality Schools Model is rejected.

4.7 Qualitative Results

4.7.1 Development of Codes, Categories, and Themes

There were five questions used to interview 14 individuals from the three participating school districts. Using the inductive approach for qualitative analysis described by Thomas (2003), I started the analysis of the interview data by reading through all of the transcripts for overall meaning, noting the voice of the interviewee and to form some general impressions of the information. Subsequent rereading and coding as described in Chapter 3 yielded the coding schema shown in Table 4.48 where Level 3 represented all of the text segments that contained knowledge related meaning, identified by either an inductive (suggested by the words of the text) or deductive (suggested by knowledge research) label. The numbers at the end of the theme phrases are from the sequential numbering of the pages of the transcripts that I used to return to the source quickly. Major themes that emerged through multiple comments are shown in bold. Four of the seven major themes recurred across the level 1 research questions, usually joined in the text with "yes-but" or similar rhetoric. All

of the recurring themes are marked with a superscript number preceding the theme phrase. There were also instances where the text units applied to two of the Level 2 categories instead of just one. For those pieces of text, I chose to note in the coding both of the knowledge factor categories that applied, rather than forcing a choice between the Level 2 categories.

Table 4.46 Interview Coding Schema

Level 1: Research questions	Level 2: Knowledge subscale	Level 3: Emergent themes from interviews
Beliefs about the Importance of the QSM	Knowledge Creation and Gathering	[1]Shared leadership and decision making are important (19) (20)
	Knowledge Availability	[2]Increases stakeholder communication (7)
	Knowledge Analysis and Use	Becoming accountable as a system (16)
	Knowledge Availability	**Increased student motivation and accountability for learning** (8) (17) (6)
	Knowledge Creation and Gathering	Creation of a knowledge culture (13)
	Knowledge Analysis and Use	Double-loop learning and feedback (10)
	Knowledge Creation and Gathering; Organizational Knowledge Use	[5]Fosters an increase of knowledge sharing, adopting, and adapting (4) (24)
	Knowledge Availability	[3]There is consistency through the codification of knowledge (4)
	Knowledge Availability	[4]There is more information and knowledge available (2)
	Knowledge Availability	**Technology is used to facilitate knowledge availability and use** (7) (14) (23) (26)

Table 4.46, continued

Level 1: Research questions	Level 2: Knowledge subscale	Level 3: Emergent themes from interviews
Challenges of the QSM in Practice (Implementation)	Knowledge Creation and Gathering	[1]Shared leadership and communication take time (19)
	Knowledge Availability	[2]**Communication to parents and stakeholders** (1) (5) (8)
	Organizational Knowledge Use	[5]**Turnover of knowledge resources** (2) (4) (17)
	Knowledge Creation and Gathering; Organizational Knowledge Use	Sticky transfer of change and success with mediocrity (5) (12)
	Organizational Knowledge Use	Amount of time required for change (20)
	Organizational Knowledge Use	[6]**Lack of absorptive capacity for change** (8) (6) (12) (17) (23)
	Knowledge Creation and Gathering; Knowledge Availability	[3]**Codification and record keeping are time intensive** (10) (11) (12) (13) (23)
	Knowledge Analysis and Use; Knowledge Availability	**Model based on individual achievement of standards rather than traditional Native cooperative learning** (5) (6) (10) (14)
	Organizational Knowledge Use	Loss of time to teach more tacit knowledge (15)
	Knowledge Creation and Gathering	Tacit knowledge is hard to codify (22)
	Knowledge Creation and Gathering; Knowledge Analysis and Use	Knowledge can become disconnected (22)
	Knowledge Creation and Gathering; Knowledge Availability	[4]There is a lack of educational resources (knowledge) tied directly to the standards (23)
Suggestions for Improvement (Gaps between beliefs about what is important and what is practiced)	Organizational Knowledge Use	More support for knowledge transfer (3)
	Organizational Knowledge Use	[5]Increase the knowledge resources of teachers through PD (4)
	Knowledge Availability	[6]Need more communication to lose the fear of change (9)

A quantitative analysis of the coding schema showed that the knowledge factor most often related to an individual theme was Knowledge Availability (22 times), followed by Knowledge Creation, and Organizational Knowledge Use (16 times each). Knowledge Analysis and Use was used in coding just 6 times. Seventeen text segments were placed in two subscales instead of just one. The majority of the pieces of text (28) were coded to the research question, "Challenges of the QSM" while 17 pieces of text were coded to the research question "Importance/belief about the QSM" and 3 were coded to "Suggestions for improvement." I was also interested to know distribution of voice or structural pose of the interview participants related to the major knowledge related themes that emerged, shown in Table 4.49. As explained in Chapter 2, the QSM can be likened to an implementation structure (Porter, 1990), a hybrid of the other types of structures where individuals assume various roles, or structural poses, that are guided by the specific activity to be accomplished. In the table, respondents were tabulated based on their structural pose within the QSM implementation structure at the time of their interview.

Table 4.47 Matrix of Major Interview Themes by Participant Job Classification

Major Theme	Structural Pose						
	Teacher	Community Member	Administrator	Board Member	Elder	Classified Staff	Parent
Increased student motivation & accountability for learning	1	2					
Technology used to facilitate knowledge availability & use	1	1	1	1	1		
Communication to parents & other stakeholders		3		1			
Turnover of knowledge resources	1		3	1	1		
Lack of absorptive capacity for change	2	3	1				
Time intensity for knowledge codification & record keeping	4		2	1			
Individual achievement of standards vs. traditional cooperative learning	2					2	

4.7.2 Discussion of Interview Themes

Ambivalence about Implementation of the QSM

Related to shared leadership and decision making, building absorptive capacity for the model, and knowledge availability, individuals provided both positive and neutral or negative comments within a single response, illustrating the concept of ambivalence described by Åkerström (2006) as a way that individuals accept change conditionally or "embrace innovation at arm's length" (p. 72). Speaking about shared leadership, one participant said it was a "main part of the model" and "I believe in that

shared leadership with students, parents, any kind of stakeholder that has anything to do with the school" but also acknowledged that "it takes longer to do things that way.... We're kind of struggling with that right now, the shared leadership/time factor."

The difficulty of building absorptive capacity to sustain the QSM was described by another interviewee who first spoke positively of the model, saying, "I would think twice before I worked for a district that supported traditional time-bound education." This participant went on to say,

> with our high teacher turnover, it is hard to get our staff completely up to speed in teaching in a standards-based system. Very few stay around long enough to master teaching in the new model, and a few that stick around do things their own way.

A third interview participant demonstrated ambivalence by first describing the amount of student progress data that is available in the model and then saying there was "too much paperwork."

Increased student motivation and accountability for learning

One of the major knowledge themes related to the importance of the QSM was increased student motivation and accountability for learning observed by the interviewees. Motivation is elemental for both knowledge acquisition and use. An interviewee described how the QSM helped students develop intrinsic motivation for learning rather than relying on external consequences or sanctions for not meeting deadlines and completing work. She said,

> Traditionally, it's the teacher [saying] you have to have this done by Friday or you get a zero and the test is on Monday. Whatever it is, I mean there were external motivators that inbuilt [the] internal motive that helps a person be successful in life. You know you had a few kids that just came about, maybe the home or just [innate] abilities, but the rest of them … and I think one of the wonderful things about the QSM is that there is a component in there that actually builds that. Skills within those kids so they don't even need a teacher for the facts, the information, and the motivation they need. They need the teacher for mentorship and guidance to bounce ideas off of them.

Another interviewee described the QSM structure and reliance on standards as getting "kids to work at their highest level." She also said the purpose was to encourage students in some way and motivate them. Another respondent said that while the framework for learning is in place, students drive the outcome:

> The larger importance of the QSM is the idea of it, the idea that we're asking kids to say, here—we've been driving this thing for however long now, you drive it. We're gonna give it deadlines, you have to do this, this, an' this, and the expectations—but really, you drive it.

Use of technology to facilitate knowledge availability and use

Technology was cited often by interviewees as significant for enabling knowledge use and transfer, as well as being a motivator for student learning; it was also disparaged as inhibiting the learning of basic skills such as spelling and cultural skills such as "filleting a fish." Technology was viewed as an "equalizing strategy" for

lack of cultural capital (English & Steffy, 2001) for rural students: "We have to make them able to compete with people from anywhere. Faceless people through the Internet or people in a worldwide community, and they're all going to be at the same abilities 99% of the time." Another interviewee described the use of technology as a learning tool for students this way:

> One of the things I'm proud of here is our tech program. Boy, our kids have come a long way in such a short period of time. Young kids that travel to Anchorage, they broadcast and are announcing a basketball game, and it's shared across the whole region. Parents don't need to spend that extra money to go to town; they can just turn on the radio. The young kids sitting behind a computer with a microphone, and they're doing what they learned in our school district, thanks to our tech people. That's something.

Yet one interviewee expressed reservation about the use of technology to assist learning by saying, "There's no place in the standards right now where you pick up an encyclopedia and look at it. It's all, 'let's go to the Internet, flip on the World Book, let's do this, let's do that.'"

Interviewees also mentioned the value of technology for organizational knowledge availability and transfer. One interviewee said,

> I think the way the district has a point person that all feedback goes to who sends it back out to the team leaders and the content area standing committee, the use of the WIKKI is certainly helpful. The first few years we had it, yes it

> was there, in and out was kind of tough deal. Now it's becoming more and more part of everybody's working day.

Several comments related to the volume of data and information that must be collected to manage student progress through the standards, also discussed by Marzano (2005) in his evaluation of the model, and then cited the value of technology to assist with this as well:

> The other part that's working very well for us right now is our program we call DART. How we record and report. The development of that has been slow and arduous, as they all are. The frustration of it's not ready. The next generation is coming, we'll have this in there, we'll have that in there. So the new version we've brought out this fall is super. That's something that works very well.

Another comment showed ambivalence related to reliance on Web-based curriculum resources.

> The beautiful part to some people is you're not constrained by saying you're going to have to use an Alaska Studies book. It's a beautiful thing to some people. You have the ability to go search; the drawback is that people don't have the time to go search. So much of what we're doing is Web-based, which is fine, but it's also, some people have found some text … the connotation 5 years ago was we don't have textbooks and everyone, some folks, said yahoo, but then they're like, "What do I use? I don't have time to look for stuff."

The major knowledge-related challenges within the QSM were communication to parents and stakeholders; the turnover of knowledge resources, which was also

related to a lack of absorptive capacity for change; the time-intensive nature of record keeping and codification of knowledge; and the individualized nature of learning within a standards-based model as opposed to more traditional Native cooperative learning strategies.

Communication to parents and stakeholders

One interviewee noted the importance of home–school communication this way: "We're a big triangle, the school, the parents and the children. If we could all connect together and be teamwork, I think everything would be better." Related to communication to parents about the structure of the reform model, another person said, "Parents are generally happy but need more information on the specifics of the system … that is sometimes too much for the staff." Another commented that "community members without children do not understand the system well enough."

One community member summarized the value of stakeholder communication and the district's efforts to communicate with those audiences by saying,

> I think parent involvement is so critical for the success of the school and not just parents - community members too…. There are people who don't have kids in the school that run for school board because they care. And those people need to be included too. This school, I have no children in this school district, but [the principal] was more than willing to send me the daily newsletter so I would know what's going on every day, that's more for me, but you know, I check in every once in a while to see what's going on so I have an awareness of some of the things going on with school and the problems….

> what they're meeting on, so that helps. So I think, again, not everyone is on the computer, but you know, they've done a lot of different things like TV and radio and every little avenue hits a few more people. It's like a little octopus with tentacles; it reaches out in different places.

A suggestion was offered by one interviewee that showed the importance of communication and the difficulty of keeping everyone informed, even in a small community:

> We're just a tiny village. It should be easy to go from house to house, but it isn't because your life is so wrapped up in your job and your focus is the children. It's like there needs to be another component, a team that works just only on communication, that doesn't have to be the principal every day or the teacher or someone who works on school operations. That's how you build your advocacy; that's how you build your support and minds working together. With that as their focus, that's just an added bonus without that much extra resource people right there in your community.

Turnover of knowledge resources

Teacher and administrator turnover in rural Alaska has traditionally been quite high. Loss of knowledge resources can act as a significant inhibitor to capacity building (Cohen & Levinthal, 1990) and implementation of change (McKinney, 2003; Szulanski, 2003). One village elder said this as a suggestion for improving education and the QSM: "Keep the teachers at the schools for longer. It seems that when a teacher leaves, it makes the kids sad. The new system is hard to learn. That one

teacher used to always complain about too much paperwork." A district administrator noted,

> With our high teacher turnover, it is hard to get our staff completely up to speed in teaching in a standards-based system. Very few stay around long enough to master teaching in the new model, and a few that do stick around do things their own way.

Absorptive capacity for change

The lack of absorptive capacity for change can result in sticky transfer (Szulanski, 2003) or individuals "doing ambivalence" (Åkerström, 2006) related to implementation of the QSM. A number of interview comments highlighted these concepts. One paraprofessional lamented,

> Have to get adjusted. Have to learn this new system, and I was used to this old. See, every time we learn something new and we adapt to it, another system comes up and changes it. It's a big cycle, cycle thing we have to learn.

A teacher with 6 years of experience in his district talked about the contrast between the QSM and school as he experienced it by saying, "It's [the QSM] confusing. How we went to school, I showed up, did the minimum, [they] stayed off my back, those are the reasons I went into education. I graduated with what you get from sitting in the desk."

A community member and retired teacher talked about the difficulty of parents in understanding the new standards-based model because it was a contrast to the mental models of education they formed while attending school. She said that

> Teachers and parents are speaking different language to each other. They [parents] don't understand—it was easy because they had gone through it, they knew what an A, B, C was—now, it's proficiency and where are we going with this? Where is my child, are they doing well was a great barrier to have to overcome because it was a language barrier. I know that the staff has been immersed in it, training, and I think they've done as many things as they possibly could with community meetings to educate the people in the community. It's like educating two groups—the child and the parents. So you've got a responsibility to educate the parent as well, otherwise there's not that support. If you can win over the parents, then you've gotten half your battle done … you've advocated a helper in some way that will multiply your efforts or respect what you're trying to achieve.

One interviewee talked about creating the capacity for change to a standards-based model among students, saying that required some transition time and some modifications to ensure that all students had a fair opportunity to succeed. "They won the kids over with a little transition time, and I think there was a little bumpy road at the very beginning like you are starting new, change is uncomfortable, but they won the kids over." Further, she said,

> Change is a long process, and I think starts out the program in elementary school and getting those kids so when they go to high school they were self-motivated. They did know the process that they had to, how to break things down and go through them one at a time and achieve at your level.

Sticky transfer can also occur when organizations and individuals are experiencing success with mediocrity, as explained by this interview comment from one experienced teacher:

> [Our site] never did really buy into the system for 2 or 3 years. We were having success with what we were doing. When I came to the district, [our school] was 12th out of 15 schools, and at the end of the third year, we had the whole same staff together; this had nothing to do with standards. We moved from 12th to the top seven schools. I think it's been easier for the younger teachers to grapple with this than the older teachers, especially if an older teacher has had some success with what they have done. I think this has been my struggle. I've been kind of on the fringe of following the system; with each succeeding principal, I've been more obedient.

The retired teacher/community member offered this sage advice regarding change: "I think that people need to always continue to change because if you're not changing and growing, you're stagnant and dying. The biggest lesson should be how to accept change or why people are afraid of that change."

Time required for record keeping and knowledge codification

As noted earlier, some interviewees recognized the importance of technology for codifying the amount of data inherent in the standards-based QSM. There were a number of interview comments about the amount of time required to codify knowledge and maintain records, consistent with the Marzano findings about the

model (2005). Others noted the difficulty of codifying tacit knowledge and the ability of codified knowledge to become disconnected and therefore less meaningful.

One teacher described her challenges in maintaining standards records for individual students by saying,

> It's a big change because I'm not used to individually toggling or darting each student a specific objective … It [the model] has its struggles because if you're teaching in a classroom and you're just with a couple of kids, you have to be on track of what the kids know and what they don't know, so it's a lot more individualized. It's a lot more work ... There are little standards checklists. So they're [students] checking off when they meet standards, but a lot of the time at the end of a lesson we're crammed for time and can't go get our standards book and see where we are emerging or developing.

She concluded by saying, "overall, I'm very happy with it, just overwhelmed. When first getting involved, it's a lot of work, but it's really good. [I] don't like the grade thing, and its data driven, so it's constant." Another teacher echoed the theme of constant data collection:

> It's tough to have one class with three, four, or five levels in the same class with the students all supposedly working at their own pace, and it gets to be no time for a teacher to have a life.

He finished by saying, "We often sit and swear, there are too many standards. I guess if I had my druthers, I'd go back to five content areas." Another interviewee

cautioned, "I mean, there's so much written material to deal with, there's going to be constant errors."

A principal observed that teaching standards "in isolation in a sense defeats the purpose." He also noted that there was a desire to include life skills within the curriculum, though it was quite difficult to turn the tacit concepts into explicit, codified standards statements.

> The hard spot for us is the foundation areas or the soft areas … even though the desire is to incorporate them across the curriculum, across the other content areas. That's hard when you actually have to check off or mark specific standards. Those are areas we have always taught children, but they weren't a graded portion.

Individualized achievement of standards versus cooperative learning

Another theme that emerged from the interview data was the contrast between the individualized nature of a standards-based model and the traditional value placed on cooperative learning and activities. One paraprofessional and community member spoke of her preference this way:

> I miss about the old time, when we would work on math. We'd all work together, all the kids would have one lesson, and we'd all be paying attention to teacher. Right now, everybody's on different levels; in order for anyone to get one-on-one time with the teacher, they have to wait their turn.

One teacher worried that the standards-based model created the expectation that students could work on their own in a self-directed fashion without being prepared for it. He said,

> The kids in our culture don't have those kinds of skills to work on their own. This isn't their culture. Because in their culture, you watch. I mean, if you're going to learn to fillet a fish, you watch Grandpapa or you watch Mom or Dad. And you maybe watch them for 6 months before you ever pick up an ulu to do it. Well, we don't do enough of that.

Most interview participants felt that the QSM was working but recognized that change requires time. Several recommended increasing the knowledge resources of teachers through good professional development with comments like "more support for training the teachers, and more opportunities for training" and "I think the issues will be addressed as time wears on. Right now, the district just needs to stay the course, train its staff, and continue to improve the model with each passing day."

4.8 Summary

4.8.1 Research Question 1: Knowledge Beliefs

Research Question 1 examined the effects of job classification, years of education experience, and years of experience in the QSM district on four knowledge belief subscales. The results of the quantitative analysis for Research Question 1 are shown in Table 4.50. Hypothesis 1 was partially satisfied, while Hypotheses 2 and 3 were rejected.

Table 4.48 Matrix of Quantitative Results for Research Question 1: Knowledge Management Belief Subscales

Question 1: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs *to be important* within the Quality Schools Model of education reform?

	Knowledge Creation	Knowledge Analysis & Use	Knowledge Availability	Organizational Knowledge Use
Hypothesis 1.1: There is a significant difference in the mean score on the "belief in importance" scale for knowledge subscales between administrators, teachers, and classified staff. **Hypothesis partially satisfied.**				
Job Class A= Administrators T = Teachers C = Classified		Between A/T, A/C	Between A/T	
Hypothesis 1.2: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between teachers based on years of education experience and based on years of experience in the QSM district. **Hypothesis rejected.**				
Hypothesis 1.3: There is a significant difference in the mean score on the "belief in importance" scale for knowledge factors between all participants based on years of education experience and based on years of experience in the QSM district. **Hypothesis rejected.**				

Overall, the mean belief scores were very positive, with the highest mean score for the variable "Our schools continually evaluate how we determine the educational needs of our students." The lowest over mean score was for the variable, "I know how well our students are performing compared to similar schools."

For the effect of job classification on beliefs, the Knowledge Availability factor had the highest mean score for administrators, teachers, and classified staff. The high mean scores related to the importance of Knowledge Availability were supported by 11 interview comments such as "The staff has been immersed in it [QSM] training." Knowledge Availability had the second highest factor score weight among the knowledge belief subscales.

Between job classification groups, administrators had a significantly higher belief score for the Knowledge Analysis and Use factor than either teachers or classified staff. Knowledge Analysis and Use had the lowest factor score weight among the knowledge belief subscales, ten points lower than the highest scoring factor, Organizational Knowledge Use. Administrators also had a significantly higher mean belief scale score than teachers for the Knowledge Availability factor. A comparison of the belief scale means by job classification is shown in Figure 4.7.

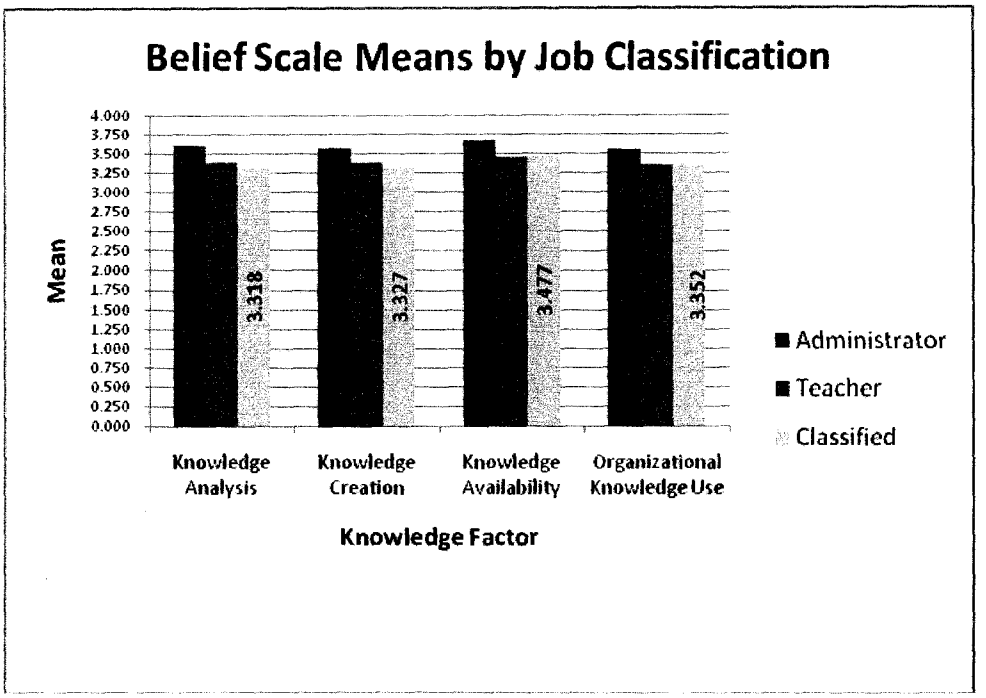

Figure 4.6 Effects of Job Classification on Belief Scale Means for Knowledge Subscales

When years of educational work experience or years of experience working in the current QSM district were used as the independent variable, there were no significant differences in mean belief scores for any of the groups, however respondents with 11 or more years of education experience or experience working in the current district had slightly lower mean belief scores than the other two groups of respondents. Participants with more experience may have lower expectations of the reform model than participants who are newer to the profession or the district. Additionally, one administrator described how the QSM is fully disclosed to prospective staff prior to any offer of employment. He felt that this practice meant that

new staff would have a higher agreement with the elements of the model from the start of their employment.

When just the teacher group of participants was used as the independent variable, the same results were observed. Additionally for the teacher group, beliefs about the importance of the Knowledge Analysis and Use variables decreased with years of experience in the QSM district.

4.8.2 Research Question 2: Knowledge Practice

Research Question 2 was similar to Research Question 1 except that it used data from the practice scale. Hypothesis 2.1 was satisfied, Hypothesis 2.2 was partially satisfied, and Hypothesis 2.3 was rejected. The results of the quantitative analysis are summarized in Table 4.51.

Table 4.49 Matrix of Quantitative Results for Research Question 2: Knowledge Management Practice Subscales

Question 2: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs *to be in practice* within the Quality Schools Model of education reform?				
	Knowledge Creation	Knowledge Analysis & Use	Knowledge Availability	Organizational Knowledge Use
Hypothesis 2.1: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between administrators, teachers, and classified staff.				
Hypothesis satisfied.				
Job Class A= Administrators T = Teachers C = Classified	Between A/T	Between A/T , A/C	Between A/T	Between A/T

Table 4.49, continued

Question 2: To what extent do administrators, teachers, classified staff, and community members perceive knowledge factors, measured using Baldrige in Education constructs *to be in practice* within the Quality Schools Model of education reform?

	Knowledge Creation	Knowledge Analysis & Use	Knowledge Availability	Organizational Knowledge Use
Hypothesis 2.2: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between teachers based on years of education experience and based on years of experience in the QSM district.				
Hypothesis partially satisfied.				
2.2a: Yrs. Ed. Exper.				
1 = 3 or < yrs. 2 = 4-10 yrs. 3 = 11 or > yrs.				Between 2/3
Hypothesis 2.3: There is a significant difference in the mean score on the "see this in practice" scale for knowledge factors between all participants based on years of education experience and based on years of experience in the QSM district.				
Hypothesis rejected.				

For all disaggregations, the mean practice scores were lower than the mean belief scores, showing that while participants considered knowledge factors to be at least somewhat important, they did not believe they were actually in practice to the same extent. The Knowledge Availability factor had the highest mean practice scale score yet it had the lowest factor score weight in the CFA. Conversely, the Organizational Knowledge Use factor had the lowest overall mean score and the highest factor score weight in the CFA, 12 points higher than the Knowledge Availability factor. The lowest mean practice *variable* score was also in The Organizational Knowledge Use factor: "The student/family data we collect is translated into solutions to student/family problems."

When job classification was used as the independent variable, Knowledge Availability had the highest practice scale mean score for all three groups, while Organizational Knowledge Use received the lowest practice scale score. Administrators had significantly higher mean practice scale scores for all four subscales than the teacher group, and the administrator group had significantly higher practice scale mean scores than the classified staff group for the Organizational Knowledge Use factor. There was a statistically significant difference between the administrator and teacher groups related to the Knowledge Creation factor in practice. Figure 4.8 compares the effect of job classification on the practice scale knowledge factor means.

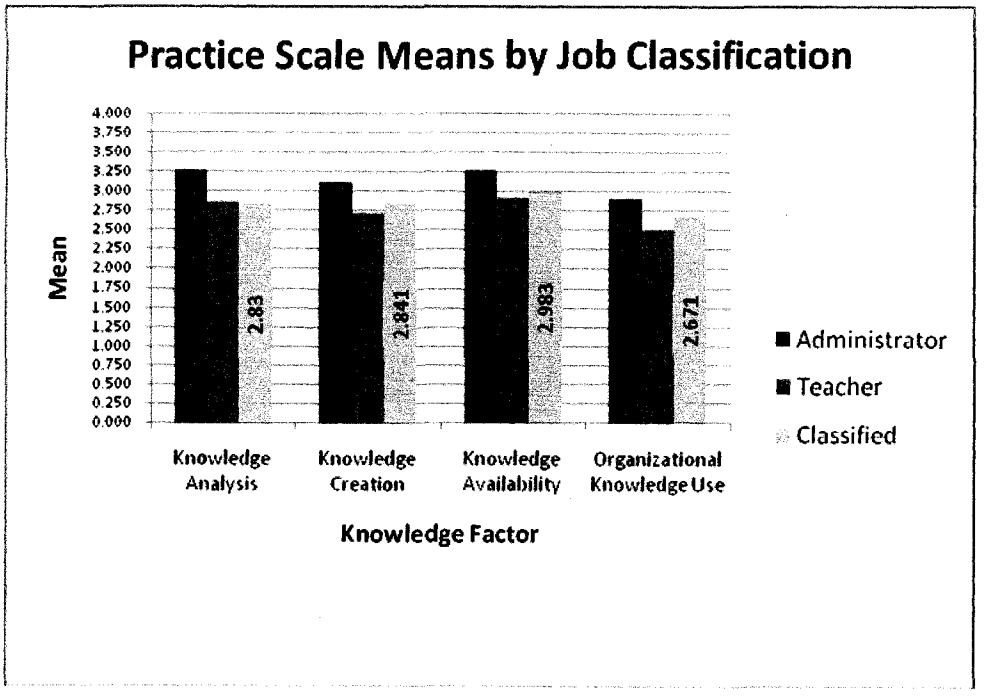

Figure 4.7 Effects of Job Classification on Practice Scale Means for Knowledge Subscales

When the teacher group of participants was disaggregated by years of overall educational experience, teachers with 4 to 10 years of experience had a significantly higher mean score than teachers with 11 or more years of experience for the Organizational Knowledge Use practice factor.

There were no statistically significant differences in mean practice scale scores for the teacher group based on years of experience in their current QSM district, though the mean practice scale scores for Knowledge Creation and Knowledge Availability subscales increased with increased district experience. The mean practice scale scores for the Knowledge Analysis and Use and Organizational Knowledge Use subscales peaked in the teacher group with 4 to 10 years of district experience and then dropped for the group with 11 or more years of district experience.

When practice scale data for the entire group of participants were examined by years of overall education experience, no statistically significant differences were found. All of the means were very similar, with the exception that teachers with 3 or fewer years of experience had a lower mean score for the Knowledge Creation practice factor. When years of experience working in the QSM district was used as the independent variable for all participants, no statistically significant differences were found in knowledge factor practice scale scores. The highest mean practice scale scores were for the Knowledge Availability factor, and the lowest mean practice scale scores for all three groups were for the Organizational Knowledge Use factor.

As stated earlier, a number of interview comments were in agreement that knowledge resources *are* available. A total of ten interview comments and two major themes were related to the Organizational Knowledge Use factor when participants discussed challenges of the QSM. A total of ten comments related to the themes of absorptive capacity (5); sticky transfer (2); and the phenomenon of staff turnover (3).

4.8.3 Research Question 3: Differences between Beliefs and Practice

The differences between mean belief and practice scores were significant *within groups* for all comparisons, shown in Table 4.52.

Table 4.50 Matrix of Quantitative Results for Research Question 3: Differences between Knowledge Management Belief and Practice Subscales

Question 3: Are there statistically significant differences in participants' belief scale mean scores and practice scale mean scores for knowledge factors and are those differences statistically significant between groups?

Hypothesis satisfied.

Group:	Knowledge Creation	Knowledge Analysis & Use	Knowledge Availability	Organizational Knowledge Use
Job Class				
A= Administrators T = Teachers C = Classified	Within A, T, C Between A/T, A/C	Within A, T, C Between A/T, A/C	Within A, T, C Between A/T, A/C	Within A, T, C Between A/T
All by Yrs. Ed. Exper. 1 = 3 or < yrs. 2 = 4-10 yrs. 3 = 11 or > yrs.	Within 1, 2, 3	Within 1, 2, 3	Within 1, 2, 3	Within 1, 2, 3

Table 4.50, Continued

Group:	Knowledge Creation	Knowledge Analysis & Use	Knowledge Availability	Organizational Knowledge Use
<u>All by Yrs. QSM. Exper.</u>				
1 = 3 or < yrs. 2 = 4-10 yrs. 3 = 11 or > yrs.	Within 1, 2, 3	Within 1, 2, 3	Within 1, 2, 3	Within 1, 2, 3
<u>Tchrs. by Yrs. Ed. Exper.</u>				
1 = 3 or < yrs. 2 = 4-10 yrs. 3 = 11 or > yrs.	Within 1, 2, 3	Within 1, 2, 3	Within 1, 2, 3	Within 1, 2, 3 Between 2/3
<u>Tchrs. by Yrs. QSM. Exper.</u>				
1 = 3 or < yrs. 2 = 4-10 yrs. 3 = 11 or > yrs.	Within 1, 2, 3	Within 1, 2, 3	Within 1, 2, 3	Within 1, 2, 3
<u>By District</u>				
LPSD BSSD KSD	Within LPSD, BSSD, KSD	Within LPSD, BSSD, KSD	Within LPSD, BSSD, KSD	Within LPSD, BSSD, KSD

Numerous interview comments concurred with the quantitative results by showing ambivalence through "yes-but" rhetoric such as, "students and staff have accepted the model and believe in it, *but* with our high teacher turnover, it's hard to get our staff completely up to speed in teaching in a standards-based system."

For all four knowledge subscales, the differences *between* administrators and teachers were significant. There was a significant difference between administrators and classified staff for three of the knowledge subscales. The gap between belief and practice mean differences was the largest for the Knowledge Analysis and Use factor for administrators compared to teachers, and also comparing the administrator mean difference to classified staff. Administrators clearly had higher beliefs about the importance of Knowledge Analysis and Use, and higher beliefs that it was happening in the district. There were significant differences between groups in the mean score difference for Knowledge Availability, meaning that administrators did not show as much difference between their belief and practice scores as teachers did. This is significant in light of the finding that the structural model for the QSM data did not show Knowledge Management as having either a direct or indirect effect on Staff Focus.

Years of education experience did not have a significant effect on the difference between belief and practice factor scores between groups, though for all groups the practice mean scores were lower than the belief mean scores; in other words, the *difference* did not increase or decrease significantly with either more or less experience. Likewise, the years of experience working in the QSM district did not have a significant effect on the difference between belief and practice factor scores between groups.

Examination of the teacher group of participants by years of education experience and then by years of experience in the QSM district showed the same

pattern of significant differences *within groups* for the belief/practice mean difference scores. There was one statistically significant difference between teacher groups for the Organizational Knowledge Use factor. The significant difference was between the group of teachers with 4 to 10 years of education experience and the group of teachers with 11 or more years of experience.

The last analysis conducted related to Research Question 3 was an examination of differences between belief and practice scale mean scores by the three participant districts using paired-samples *t*-tests. The same pattern established with other demographics also occurred with the district data. For each district, there were statistically significant differences between belief and practice mean scores for all four knowledge subscales, all with a moderate eta squared value.

4.8.4 Research Question 4: A Structural Model of the QSM Data

Using CFA and SEM, Research Question 4 examined the causal paths between the seven Baldrige factors using data from the practice scale of the QSM Questionnaire. Leadership was the driver for the Quality Schools model and had a direct effect on Knowledge Management and Staff Focus. Leadership had a strong indirect effect on the remaining four factors. Some direct causal paths between endogenous factors were also supported by the QSM data. Knowledge Management did not have an expected effect on Staff Focus, either directly or indirectly, possibly due to limitations of the model or possibly because knowledge about the Quality Schools Model is coming from outside the system rather than from district leadership.

Results showed that not all of the causal paths of the theoretical model were supported by the QSM data set, especially related to interaction among the factors of Strategic Planning, Knowledge Management, Staff Focus, and Process Management. When the Quality Schools model was compared with models produced by others, Process Management predicted Student, Stakeholder, and Market Focus as well as Results, similar to the Wilson and Collier (2000) findings. Wilson and Collier (2000), Winn (1996), and Badri et al. (2006) all showed Leadership as having a direct causal path to the four system factors (Knowledge Management, Process Management, Staff Focus, and Strategic Planning), but not all of these relationships were supported by the QSM data: Leadership only directly affected Knowledge Management and Staff Focus in the Quality Schools model. Badri et al. (2006) found a direct and significant path from Leadership to both of the outcome factors (Student, Stakeholder, and Market Focus and Results), but the QSM data showed that the effect of Leadership on those factors was indirect, similar to what Winn (1996) and Wilson and Collier (2000) found. Similar to Winn's model, the Quality Schools model showed a direct effect of Staff Focus on Results.

CHAPTER FIVE: SUMMARY AND DISCUSSION

The final chapter of this dissertation contains a restatement of the research problem followed by a review of the research methods used to answer the research questions. Next, the major results are summarized, followed by a discussion of the themes represented by the research results. The chapter concludes with implications from this research for the QSM and suggestions for further research.

5.1 Research Problem

This research was an analysis of individuals' perceptions about the importance of and the implementation of the QSM through the lens of one of the seven Malcolm Baldrige Education Criteria for Performance Excellence. Specifically, it was an inquiry to determine the difference in beliefs and implementation related to knowledge constructs between and within groups, and to form conclusions about the role of knowledge factors in the implementation of the QSM in rural Alaska school districts. Last, this research examined the fit between the Baldrige in Education theoretical model and actual practice in the context of rural Alaskan school districts implementing the Quality Schools model of comprehensive education reform.

5.2 Methodology

In this concurrent nested design mixed-methods study, we used a questionnaire administered to school staff for primary data collection. I used 17 items from the questionnaire that measured the belief in the importance of knowledge variables (one scale) and respondents' belief that the same knowledge items were evident in practice

(second scale). The relationship between respondents' demographic characteristics and the mean scores for four knowledge subscales was examined for belief and practice scales using one-way analysis of variance statistics and for differences between the two scales using mixed between-within analysis of variance and paired-samples *t*-tests. At the same time, implementation of the QSM was described qualitatively through semi structured interviews with 14 school staff and community members. Finally, the causal relationships among the seven Baldrige in Education constructs were examined using SEM, resulting in an alternative to the Baldrige in Education theoretical model that represents the constructs in practice specific to this research setting.

5.3 Summary of Major Results

There are 8 major results themes that emerged from this study, listed in Table 5.1.

Table 5.1 Major Results Themes from the Study of Knowledge Factors Specific to QSM Implementation in 3 Rural Alaska School Districts

	Theme
1.	Administrators have more positive beliefs about the importance of and a higher perception of the implementation of knowledge subscales than do teachers or classified staff meaning that the classroom-level implementation of the QSM by teachers may be linked to causal ambiguity.
2.	When the difference in belief and practice scores was compared, there were statistically significant differences *within* all 18 groups, and *between* levels for two groups, suggesting ambivalence and sticky transfer in the street-level implementation of the QSM.
3.	Knowledge management is significantly and directly affected by Leadership and in turn, Knowledge Management has a significant effect on all other endogenous factors in the QSM structural model except for Staff Focus, with possible implications for implementation success.
4.	Knowledge, in the form of education services is effectively coproduced within the QSM.
5.	There is a significant, strong influence of leadership facilitating knowledge activity related to the QSM shared vision and continuous improvement components resulting in perceived stakeholder satisfaction.
6.	While there is agreement that information technology is available, time is an issue in knowledge analysis and use.
7.	Staff turnover and absorptive capacity are probably impediments to the collection, codification and transfer of knowledge in the QSM.
8.	The standards-based design of the QSM with its focus on explicit codification of knowledge targets and student achievement, may not allow for traditional ways of cooperative learning and transfer of tacit knowledge.

The implementation of education reform initiatives, such as the QSM that are based on the idea of transformation quality, would benefit from careful attention to

knowledge: the creation and growth of knowledge assets within staff and the use of knowledge to facilitate and inform all activities, processes and results within the organization. Leaders have an important role in creating effective knowledge-using organizations and in mitigating key knowledge inhibitors – sticky transfer, ambivalence, and causal ambiguity.

The results from this study of knowledge related beliefs and practices within the QSM are discussed individually in the next section. In the discussion, I've tried to remain mindful of Eisner's (1998) description of successful inquiry as extending beyond merely digging up facts. Eisner claimed that educational inquiry becomes believable "because of its coherence, insight, and utility." Further, he said inquiry is ultimately "a matter of persuasion, of seeing things in a way that satisfies, or is useful for the purposes we embrace" (p. 39).

5.4 Discussion of Results

Knowledge management activities are critical to the effective management of a school organization and for improvement. It takes deliberate attention and action to gather and create knowledge, transfer and develop the knowledge resources within a school organization, and conduct the core business of education: teaching and learning. Difficulties can arise when individuals do not have absorptive capacity for knowledge or knowledge transfer becomes sticky. Thompson (2003) said, "The conversion of private insight into sharable—teachable and learnable—understanding is not an automatic process" (p. 155). The idea that knowledge activity – the creation, use, transfer, and codification of knowledge – needs facilitation makes it more notable

that in the QSM structural model, no connection could be established between the Staff Focus and Knowledge Management variables, though the Knowledge variable had either a direct or indirect effect on all of the other endogenous latent variables.

The QSM questionnaire used in this study was unique because it measured responses on two scales—essentially it was two questionnaires in one. The instrument measured beliefs about the importance of concepts as well as beliefs about whether the concepts were actually in practice. The questionnaire design allowed me to look at the differences between respondents' beliefs about importance and perceptions about what was in practice, establishing that in all cases, beliefs about importance were significantly higher than were perceptions that the concepts existed in practice.

5.4.1 Job Classification and Causal Ambiguity in Implementation of the QSM

The questionnaire data from this study showed that job classification was the greatest predictor of mean responses for both beliefs and for what participants perceived to be in practice. Administrators had higher mean scores than the either teachers or classified staff for all four knowledge subscales on the belief scale as well as on the practice scale. Results showed that administrators perceived that knowledge activities were in practice to a greater degree than teachers did, which was consistent with earlier findings of Cho et al. (2005) that implementation of policy or reform in the public service sector is higher for professionals with more education and more experience. This conclusion is based on the assumption that administrators probably have more education than most teachers as a condition of their administrator certification. State certification requirements also include a minimum of 3 years of

experience for administrators; 78% of the administrator group reported that they had more than 10 years of education experience, as compared to the teacher group where 38% reported they had more than 10 years of education experience.

Unlike job classification, neither years of education experience nor years of experience working in the QSM district had a significant effect on response differences between groups with one exception. When results were examined for the teacher group as a subset of the larger research population, the teachers with the most experience had significantly lower mean belief, practice, and difference scores for Organizational Knowledge Use than teachers with less experience. That factor includes items that measured sharing of best practices and collaboration among staff members which more experienced teachers apparently viewed as less important and not part of regular practice in their setting.

The Organizational Knowledge Use factor had the lowest mean belief and practice scores and the largest difference between belief and practice scores for the variables within the factor. Conversely, Organizational Knowledge Use was clearly the most important of the Knowledge Management subscales, with the highest factor weight score for both the belief and practice scales. The lower results for the Organizational Knowledge Use factor may be due to what Szulanski (2003) called *causal ambiguity*—the incomplete understanding of the knowledge being transferred and ability to discern which knowledge is valuable and critical to transfer. Szulanski said, "Routinized use of causally ambiguous knowledge is often accompanied by gaps between the expected and actual patterns of knowledge use" (p. 26). The higher the

causal ambiguity, the wider the gap will be between beliefs and practice. This phenomenon may be most evident within the group of highly experienced teachers.

When causal ambiguity exists, the exact reasons for success or failure of results (i.e. student achievement, or implementation of reform) cannot be determined with any kind of precision to make it likely that the results can be repeated or mitigated. To reduce causal ambiguity relevant information must be communicated accurately – it puts knowledge activity squarely at the nexus between leadership and staff working as the street-level implementers of the QSM.

5.4.2 Ambivalence and Sticky Transfer Related to Change and Implementation

All groups in this research study, whether based on job classification, years of education experience, or years of experience in the QSM district, had mean practice scores that were lower than their mean belief scores, which may indicate "doing ambivalence" related to the QSM. One of the highest knowledge creation mean belief scores was for the variable "Our schools continually evaluate how we determine the educational needs of our students," however participants demonstrated ambivalence by giving lower belief and practice scores to the variable "I know how well our students are performing compared to similar schools."

Doing ambivalence, as explained by Åkerström (2006) is important to note because it signals conditional acceptance of change. Individuals in this case may have been expressing agreement with the QSM tenets in theory but in practice were accepting them conditionally or modifying the basic tenets to fit their own mental models. One illustration of this was found in interview comments related to the

volume of codification required to maintain standards-based student achievement records in the QSM that was noted by Marzano (2005).

Ambivalence or conditional acceptance may also occur because the reform or change as designed does not fit local conditions. Maynard-Moody, et al. (1990) noted that "Street-level workers who are close to problems and clients are likely to know what works in local environments and for particular groups" (p. 833). Ambivalence is closely tied to both causal ambiguity and sticky transfer. Ambivalence is not always a bad thing – conditional implementation allows initiatives such as the QSM to morph over time, possibly making the implementation more successful and making teachers the ultimate authors of the reform. According to Maynard-Moody, et al. (1990) local adaptation by front-line employees is crucial to implementation of policy or reform.

The transfer of a reform initiative or a good idea within it can become sticky or stuck through a variety of conditions. One cause of sticky transfer is unsubstantiated claims of success of the knowledge or absence of proof that it works. This does not seem to be the reason for sticky transfer of the QSM. Other reasons for sticky transfer are implementer-related, such as lack of motivation to implement change or lack of prior related knowledge or experience to connect to the new concepts – what Nonaka and Takeuchi (1995) and Cohen and Levinthal (1990) called our mental models. Lack of prior experience with standards-based design is the most likely explanation for ambivalence and sticky transfer, since about half of the participant group reported three years or less working in their current standards-based school district.

5.4.3 Knowledge Management Paths in the QSM Structural Model

The Baldrige 2006 theoretical model shows Knowledge Management as foundational to the Baldrige in Education quality criteria. The CFA measurement model of the Knowledge Management component for QSM data showed that all four of the knowledge subscales were well correlated, meaning that for Knowledge Management to be effective all four variables should be present. The QSM data also showed that while each variable contributed a different amount to the construct, each of the knowledge subscales was important.

The QSM structural model is unique in that while it shares similarities with what other researchers found, it also contains differences. Leadership is clearly the driver of the Quality Schools model similar to what other researchers found, yet unlike Winn's (1996) model Leadership only directly affects two systems factors: Staff Focus and Knowledge Management. Leadership has a strong total effect on all other factors in the Quality Schools model. Knowledge Management in the Quality Schools model directly or indirectly affects all of the other endogenous factors except Staff Focus. This is an important finding given that the Baldrige criteria state that, "The focus of an organization's knowledge management is on the knowledge that people need to do their work, to improve processes, keep current with changes, and to be innovative" (NIST, 2006, p. 45). The lack of a path from Knowledge Management to Staff Focus contrasts with the results found by Badri, et al. (2006), Wilson and Collier (2000), Pannirselvam and Ferguson (2001), and even Winn (1996) who demonstrated an indirect path from Knowledge Management to Staff Focus. Winn (1996) called staff

and leadership the "actors" responsible for using knowledge, which he said was preparatory for action. This is consistent with Lipsky's (1980) view of staff as street-level implementers of policy and reform.

Without the inclusion of Knowledge Management as a direct or indirect influence on Staff Focus, it appears that all knowledge about the model must either flow from Leadership, come from outside the organization, or be contained within Staff Focus. Any of these options could produce the lower implementation scores seen in this research. The idea that knowledge about implementation of the model flows entirely from leadership would likely result in lower implementation success due to the significant and important difference in perceptions about knowledge activity between administrators and teachers shown in this research. Administrators are much more likely to believe knowledge is available and used than are teachers. A knowledge route that flows from leadership to staff is characteristic of bureaucratic organizations, contrary to shared leadership described in the Quality Schools Model.

As stated in Chapter 2, replication and implementation of the QSM is heavily dependent on individual and organizational knowledge sharing and transfer. The lack of connection between the knowledge and staff focus variables corroborates Marzano's (2005) findings related to the QSM measured against the Comprehensive School Reform criterion for professional development (Criterion #3). Marzano found there was little explicit guidance about implementing the Quality Schools Model, a likely outcome of the knowledge/staff focus disconnect.

A reasonable hypothesis is that implementation of a comprehensive education reform initiative such as the Quality Schools Model would be more successful in a model where a direct path from Knowledge Management to Staff Focus exists. The lack of a path from Knowledge Management to Staff Focus is also likely related to the results of this study showing sticky transfer and ambivalence in implementation of the QSM. A full and sustainable implementation of reform needs to include the effective creation, use, and transfer of knowledge.

5.4.4 Effective Coproduction of Knowledge as Education Services

Results from this research support the conclusion that the QSM helps students develop some intrinsic motivation for learning despite the structure of the larger policy environment that is focused on external motivators and sanctions for learning. Instructional design features of the QSM such as use of performance demonstrations and making the task environment a naturalistic setting may be contributors to the development of intrinsic motivation noted by the participants in this study. One Elder and school board member eloquently summarized the community voice related to the coproduction of education with an exhortation to students to do their very best. His statement reflected the community pride in the learning and achievements of local students. The community as a coproducer of education services is essential when change and growth are the intended results, according to Whitaker (1980). Porter (2007) said, "Motivated students and parents are indispensible in the effective coproduction of education services" (p. 13).

A number of knowledge management authors, including Nonaka and Takeuchi (1995) have described the importance of intrinsic motivation as the impetus for knowledge seeking and creation and for externalizing and transmitting tacit knowledge. Whitaker (1980) pointed out that successful coproduction of education is dependent on willing and voluntary participation. Leonard (1995) cited an enthusiasm for knowledge as one of the keys to a vibrant, innovative organization. "This love of learning is woven through the organization." Further, she said that in innovative organizations the individuals engaged in building the core technology—in this case, teachers and students—are "*curious:* they are information seekers" (p. 261). Interview comments supported the conclusion that the QSM is a good tool for the development of intrinsic motivation for knowledge and learning in students.

Increased organizational accountability for the coproduction of knowledge also emerged from the data. One teacher noted, "We're becoming accountable, and we have not been accountable." This is important since knowledge creation starts with organizational intention about the kind of knowledge to develop (Nonaka and Takeuchi, 1995). Organizational motivation for knowledge creation appears to be coming from features of the QSM rather than from the accountability requirements of federal education reform policy. A positive sense of accountability can serve as a motivator for organizational actors to voluntarily coproduce education.

5.4.5 The Influence of Organizational Leadership on Knowledge Activity

The role of leadership in facilitating knowledge activity is evident by the strong and significant causal path in the QSM structural model from Leadership to

Knowledge Management. The QSM structural model shows a direct path from Knowledge Management to Strategic Planning and an indirect path from Knowledge Management to Process Management leading to the Student, Stakeholder and Market Focus, and Results variables: Leaders are the individuals driving knowledge activity along these paths. Leonard (1995) wrote that in an innovative organization, "Managers respect and encourage the accumulation of knowledge as a legitimate undertaking and one for which they are responsible" (p. 261). Leonard (1995) said that knowledge creation and gathering are dependent on activities that are essentially neutral such as problem solving, experimentation, and importation, and that it is "the management of those activities that determines whether they foster or inhibit the unimpeded development of critical knowledge" (p. 30). Nonaka and Takeuchi (1995) placed a great deal of emphasis on the role of top and middle management for knowledge creation. That the middle-up-down flow of knowledge described by Nonaka and Takeuchi is occurring within the QSM districts was summarized by the school board member who said, "Students, teachers—they know that they can have a voice in the way we're gonna run things." The lack of Knowledge Management at the nexus between leadership and staff was illustrated by the significant difference in perception of knowledge activity in practice between administrators and teachers. Administrators are functioning as knowledge leaders and managers more effectively for creating shared leadership, shared vision, and continuous improvement than for helping staff understand and implement the standards-based design of the Quality Schools model.

Both the quantitative and qualitative results of this study show that knowledge resources are having a positive influence on the continuous improvement and shared vision components of the QSM resulting in stakeholder satisfaction. This is notable since the most important tie that binds individuals to an implementation structure such as the QSM is a set of shared values, expressed formally in the QSM as Shared Vision. The knowledge activities related to continuous improvement and shared vision are more likely to be led by administrators, which may account for their higher mean scores on the Knowledge Analysis and Use factor for both belief and practice scales.

The results from this study support Reagle's (2007) conclusions about the elements leading to effectiveness of the shared vision process. The shared vision process within the QSM is heavily dependent on informal knowledge networks in local communities and borrows much from the Alaska Onward to Excellence process; R. Barnhardt (1992) advocated for informal local knowledge networks as the most appropriate communication structure for garnering participation by Alaska Natives in institutions such as schools. One of the elders interviewed described in positive terms his ongoing regular communication with the school principal in his community. Nonaka and Takeuchi (1995) stated that direct two-way communication is the most effective for establishing stakeholder requirements and that social interaction is critical for mobilizing tacit knowledge held by those within and outside the organization. That this was occurring was supported by a number of interview comments that mentioned the shared vision specifically such as "The shared vision is good." Systems continually send signals to themselves through double-loop relationships, which drive

improvement efforts (Senge et al. 2000). One teacher summarized this related to the QSM and her district by saying, "[Our district model] has four components. It's data driven and [includes] continuous improvement—always self-reflection."

5.4.6 The Relationship between the Availability of Information and Time for Knowledge Analysis and Use

The availability and use of technology to support the collection of best practices and organizational knowledge and for collaboration was one of the five organizational characteristics cited by O'Dell and Grayson (1998) for successful knowledge transfer. There was concurrence between questionnaire data and interviews that technology is available and used. There was lower agreement that the capacity exists to break knowledge into meaningful units, shown by a low practice scale score and large mean difference between belief and practice for the variable "When our schools review our student/family satisfaction results, they are able to break the data into appropriate groups."

O'Dell and Grayson (1998) remind that technology makes connections possible but does not guarantee knowledge creation or use. Knowledge creation fundamentally occurs at the individual level. It is always people who add the context, experience, and interpretation that transform data and information into knowledge. The participants in this research seemed to recognize the high level of information that must be collected and be available in a standards-based education model. Of the availability of information, one teacher said, "With a high teacher turnover rate, it is crucial that this road map of student expectations exists from year to year." However, other interview comments indicated that standards-based curricula may not always be

available and that teachers had to hunt for resources that would align with district standards.

Marzano (2005), in his assessment of the QSM noted the volume of standards, targets, and assessments in the QSM and stated there simply was not time for teachers to manage this much information. In the research literature, time was cited by Ingram et al. (2004) as an issue in the collection and meaningful use of information and knowledge; this theme was repeated in interview responses such as "It's a lot more work" and "I'm overwhelmed." The theme of time as a barrier to effective use of knowledge is reflected in some of the lowest questionnaire responses from the practice scale for the variables "I know how well our students are performing compared to similar schools" and "Information about best practices is collected and shared among staff members." One study done by APQC (1999) found that most knowledge sharing in organizations was through the structure of formal processes. Organizational time for sense making and transforming information into knowledge and knowledge sharing would seem to be important for creating the best individual and organizational decision making and for implementation of comprehensive reform.

5.4.7 Knowledge Resource Capacity and Staff Turnover

Building and managing knowledge assets includes developing the knowledge of staff. Developing staff was cited by Marzano (2005) as an area where the QSM could be strengthened related to the federal CSR criteria. The data from the questionnaire in this study supports that finding, specifically via the practice scale mean score for the variable "Information about best practices is collected and shared

among staff members" and the practice scale mean score for the variable "Our district measures staff learning and development in areas such as collaboration and knowledge/skills sharing." These scores were consistent with interview comments such as "Right now, the district just needs to train its staff" and "As a new teacher, it's tough, it's hard staying on top of it."

Related to transfer of best practice such as within the QSM, Szulanski (2003) said, "Research results show that prepared [knowledge] recipients, and an intimate relationship between source and recipient, go a long way in reducing barriers to transfer best practices" (p. 72). The pace of change also seems to be important—if the pace is too slow, the "retentive capacity" for existing practices will act as a barrier to the transfer of new best practices; conversely, if the pace is too fast, change doesn't get implemented (Szulanski, 2003). Absorptive capacity includes the ability to recognize, accept and apply new and different concepts and ways of doing things. Absorptive capacity is built on the premise that individuals have some kind of pre-existing knowledge or experience to connect with the new information. Teachers routinely apply this concept when they conduct a task analysis in the course of designing instruction for students. It is possible that some of the features of the QSM are so novel that staff members as implementers do not have the absorptive capacity to recognize and use best practices. This concept was illustrated by the rhetoric of some of the interview responses, such as the third-grade teacher who said, "Teachers are not risk taking people." and the elder who remarked, "When you're used to something for so long, when you introduce change you get a lot of resistance, a lot." As I noted in

Chapter 2, from a school district standpoint it pays to develop the absorptive capacities of individual staff members since this will ultimately position the district to assimilate and adapt new knowledge more quickly and effectively – even in settings such as rural Alaska that are beset with high staff turnover.

Davenport and Prusak (1998) noted that the most tacit, inarticulate, and complex knowledge in an organization is the hardest to codify. This can be problematic when districts are faced with high turnover and the need to capture expertise for reuse.

One new teacher said, "It's hard to learn the model and teach kids at the same time. It's overwhelming." Fullan (2001b) and Senge et al. (2000) advocated local networks to transfer complex, tacit knowledge and noted their importance because knowledge becomes specific and useful at the local level. Mentoring and apprenticeships are generally the staff development preference for transferring complex, tacit knowledge; however, this can be unrealistic in very small schools in rural Alaska with just one or two teachers. Large multi-national and international companies and organizations are using technology to facilitate the transfer of even this very difficult type of knowledge; It would be worthwhile to leverage the wide availability and use of technology reported by participants in this study to build organizational knowledge capacity and facilitate the explication and transfer of complex, tacit knowledge.

5.4.8 The Explicit Codified Knowledge of Standards vs. Traditional Cooperative Transfer of Tacit Knowledge

Some interview comments praised the individualized, standards-based features of the QSM for fostering intrinsic motivation for learning and knowledge; conversely

this then surfaced in interview comments as a concerning contrast to more traditional Native cooperative learning practices. Questionnaire results for the variable, "The district has effective ways to communicate important information to students" supported the concern with a large difference (.68) between belief and practice mean scores. The very process of creating standards requires knowledge to be codified and categorized and may make it more difficult to see the pieces fit into some big idea.

A number of researchers (Barnhardt, 1992; Demmert, et.al., 2006; Lipka, et. al., 2007; and Tharp, 2006) agree that educators need to develop an understanding of the frame of reference toward knowledge in Native communities, namely its tacitness and a preference for a "watch, then do" approach to knowledge transfer. Nonaka and Takeuchi point out that the conversion of tacit knowledge to explicit is a social process that occurs during interaction of individuals, rather than within an individual acting alone. Lipka et al. (2005) called for expert-apprentice modeling as a "culturally responsive way to bridge the explicit teaching of concepts." It seems clear from the results of this research that the positive value of standards-based instruction for creating intrinsic motivation needs to be balanced with the social, cooperative process of learning and transmitting tacit knowledge.

5.5 Implications and Recommendations for Knowledge Management within the QSM

The actual or street-level implementation of any education policy or reform initiative, such as the QSM, is paradoxical because there is room for flexibility and innovation, yet it also allows for ambivalence and local adaptation from the model's ideal state. Implementation is influenced not only by organizational characteristics, but

also by skills and abilities of leaders and teachers, and by the social environment and conditions, i.e. rural Alaska communities and stakeholders. This research provided evidence that all of these factors are influencing the implementation of the QSM.

The QSM of education reform has four broad components: leadership, shared vision, standards-based instruction, and continuous improvement. Knowledge activities and knowledge management, as defined in this research, are inherent in all four components of the QSM. Table 5.2 summarizes the scope of knowledge activities one might expect to find in the implementation of the QSM. Based on the results of this research, some of these knowledge activities are occurring to a higher degree than others.

Table 5.2 Knowledge Activities That Should Be Present Within the QSM

QSM component	Knowledge activities that should be present
Leadership	¤ Leadership that promotes knowledge acquisition, use, and transfer (Leonard, 1995; Von Krogh, Ichijo, & Nonaka, 2000) ¤ Middle-up-down management, i.e. shared leadership (Nonaka, 1994; Nonaka & Takeuchi, 1995) ¤ Organizational knowledge acquisition, creation, and codification (Davenport & Prusak, 1998)
Shared vision	¤ Development of individual and organizational absorptive capacity (Cohen & Levinthal, 1990) ¤ Use of the knowledge spiral (Nonaka & Takeuchi, 1995) ¤ Making tacit knowledge explicit (Polyani, 1966, Nonaka & Takeuchi, 1995)
Standards-based design	¤ Learning organizations (Dalkir, 2005; Fullan, 2001a, 2003; Senge et al., 2000; Senge et al., 1999) ¤ Knowledge as part of core technology (Choo, 1998; O'Dell & Grayson, 1998) ¤ Culturally sensitive knowledge practices (Barnhardt, 2005, Taylor & Osland, 2003) ¤ Best practice, knowledge transfer, and mentoring (Davenport & Prusak, 1998; Senge et al., 2000) ¤ Knowledge markets (Cross & Prusak, 2005; O'Dell & Grayson, 1998; Szulanski, 2003)
Continuous improvement	¤ Technology that supports all KM activities and functions (Davenport & Prusak, 1998; O'Dell & Grayson, 1998) ¤ Balanced scorecard (Kaplan & Norton, 1996) ¤ Double-loop learning (Argyris & Schön, 1978; Senge et al., 2000) ¤ Use of the knowledge spiral to explicate and codify tacit knowledge (Nonaka & Takeuchi, 1995)

The results of this research show that knowledge activities are contributing to the effectiveness of the shared vision and continuous improvement components of the QSM. The Quality Schools structural model showed a direct path between Leadership and Knowledge Management. Pannirselvam and Ferguson (2001, p. 31)) concluded that effective leadership and knowledge management were essential for organizational success. The implications and recommendations related to knowledge management that are presented in this section are focused on leadership and staff (the street-level implementers of reform) and are geared toward strengthening the relationship between leadership and staff perceptions related to knowledge activity and implementation of education reform.

The results of this research suggest that while there is a lot of knowledge available, there is also evidence of ambivalence among staff in implementation of the QSM, a possible lack of absorptive capacity for the design of the model, and instances of sticky transfer indicated by the lack of a direct or indirect path from knowledge management to staff focus. The widely held viewpoint is that policy and reform are shaped by street-level bureaucrats, i.e., teachers and site administrators (Lipsky, 1980); therefore, it would seem important to increase the perception of the QSM knowledge-related subscales and variables *in practice* among that group. The practice scale scores are likely the most accurate reflection of the QSM implementation, with the degree of ambivalence about implementation measured by the difference between belief and practice scores.

5.5.1 Implications for Leadership

Leaders, as the driver of the Quality Schools Model of education reform, have a responsibility to create an organizational environment for effective knowledge activity. Thompson (2003) cautioned that "A final limitation on the administrative process is lack of knowledge.... innovative solutions to basic administrative problems are not easily found" (p. 154). Von Krogh, Ichijo, and Nonaka (2000) talked about the difficulty in quantifying the human processes involved in knowledge management. With that in mind, I am acutely aware that any suggestions offered here based on knowledge management theoretical literature may or may not work in the unique environment of a rural Alaska school district.

The QSM of education reform is an example of an implementation structure interacting with government structures (federal policy, state department of education) and the professional structure of school staff (teachers and administrators) acting as street-level bureaucrats. Nonaka and Takeuchi (1995) provided guidance for the knowledge activity that leaders must facilitate for an implementation structure to be effective. Administrators must enable rather than control knowledge activity. In addition to ensuring that knowledge is available to the professionals implementing reform on the street level, Nonaka and Takeuchi said leaders must understand, mediate, and interpret the vertical and horizontal flows of knowledge in the organization. Knowledge enabling includes facilitating relationships and conversations as well as sharing local knowledge across the whole organization. To this end, it would be useful to develop leaders' understanding of the nature and characteristics of

knowledge transfer stickiness: absorptive capacity, causal ambiguity, and quality of relationships. Szulanski's (2003) research showed that these knowledge-related subscales have the biggest impact on implementation of change and reform, superseding motivation as a factor. Further, it might be useful to develop the skills of administrators for increasing absorptive capacity for the QSM among staff and community stakeholders.

Standardization, such as the standardization that occurs across QSM districts in the form of written student achievement standards, has been shown to increase meaningful knowledge transfer across units and create consistency in implementation (Argote, 2005). However, QSM districts have an M-Form structure (Williamson, 1991) where individual sites have autonomy over instruction and student achievement of standards, which Williamson noted was especially important when each operating unit faced unique conditions, such as the case with the widely dispersed communities in rural Alaska. Williamson also said that the success of these subunits (schools) is dependent on a well-functioning knowledge market and knowledge management strategies. In school districts with widely dispersed and autonomous sites, Argote suggested,

> A balance between standardization and local adaptation is key. Rather than regiment what the units should do, providing them opportunities to interact with each other, to learn best practices, and to adapt them to local conditions will be more effective. (p. 180)

O'Dell and Grayson (1998) said that one of the four enablers of knowledge management is an infrastructure that supports knowledge creation and transfer—a structure such as the middle-up-down organization described by Nonaka and Takeuchi (1995) for knowledge activity; conscious attention to knowledge processes; and deliberate activities such as networks, mentoring, and other opportunities for individual and group learning. An organizational infrastructure to decrease ambivalence and sticky transfer of knowledge and increase the absorptive capacity of staff recasts administrators as "knowledge engineers." Last, Leonard (1995) cited an enthusiasm for knowledge—respect and encouragement for its accumulation—as a key characteristic of leaders who support knowledge development in an organization.

Leaders must be what Van Krogh, Ichijo, and Nonaka (2000) called knowledge activists: individuals who can not only run a school or district day-to-day, but also have a vision for the implementation of the reform model, in this case the QSM; the ability to connect internal and external knowledge; and the ability to mobilize staff throughout the district to use knowledge more effectively. For this to occur, leaders must understand the significant difference in perception about the employment of knowledge practices that exists between leadership and staff. Strengthening the link between leadership, staff, and knowledge management should begin with conversation about the differences, within an enabling context – either virtual or physical – that is dynamic and people responsive, and fosters the sharing of tacit knowledge. It is likely that since schools are so geographically disbursed in rural Alaska, technology must play a role in this sort of knowledge activity.

5.5.2 Implications for Standards-Based Instruction and Staff Development

The implications for the standards-based design component of the QSM are directly related to those for leadership. Most of the suggestions for improvement of the QSM that were offered during interviews were related to the development of the knowledge resources of teachers. Suggestions from interviewees included "have more teacher training and allow teachers to do more sharing" and provide "more support for training the teachers and more opportunities for training."

Nonaka and Takeuchi (1995) explained the relationship between individual and organizational knowledge this way:

> The individual is the creator of knowledge and the organization is the amplifier of knowledge. But the actual context in which much of the conversation takes place is at the group or team level. The group functions as the synthesizer of knowledge. The more autonomous, diverse, and self-organizing the team, the more effectively it will function as a synthesizer. (p. 240)

Since teachers and other staff function at the street level to implement the QSM, it seems important to increase the "in-practice" perceptions of the model among teachers, reducing the incidence of ambivalence. Nonaka and Takeuchi (1995) suggest the creation of a high-density field where frontline individuals have routine opportunities to interact—such as professional learning community meetings, joint planning time, and so on—where hunches, perceptions, mental models, beliefs, and experiences can be converted into something that can be communicated and transmitted as explicit knowledge. Other suggestions include incentivizing knowledge

sharing by rewarding it through the employee evaluation process and language and publicizing the work and efforts of staff known for their efforts as knowledge leaders. All of these actions within an organization legitimatize knowledge; nowhere is this more important than in education where knowledge is the resource or coin of the core technology of teaching and learning.

A continual challenge related to creating, using, sharing, and transferring knowledge in rural Alaska school districts is the high turnover rate for staff. Important knowledge can be codified and stored for organizational memory, but the most valuable knowledge in a school district resides with staff. When staff members leave, so does important knowledge. School districts get the most organizational benefit from the professional knowledge and expertise of staff members when there are frequent opportunities for sharing and learning, both formal and informal. The Baldrige criteria (NIST, 2006) suggest that organizations determine what knowledge is critical and then implement systematic processes for knowledge sharing, saying "This is particularly important for implicit knowledge personally retained by staff" (p. 47).

5.6 Limitations and Suggestions for Further Research

The literature and research on change show that change takes time. March (1991) suggested that learning and implementation over a longer time period lead to the exploration of a wider set of strategies and that faster learning or implementation may foreclose options prematurely. To their credit, the implementation of the QSM is a dynamic process that has been underway for some time in all three districts that participated in this study. The difficulty in making recommendations is that the data

represent one point in time—a snapshot—and may not present the whole picture of the model. As all three of the school districts that participated in this research are effectively engaged in continuous improvement, it is likely that data gathered now or at another future point in time may lead to slightly different conclusions about implementation.

This study focused on organizational systems factors and did not include data about student achievement results, which was instead the focus of the research done by Coladarci, et al. (2005). A suggestion for further research would be to correlate student achievement outcomes to the QSM structural model to test a hypothesis that student achievement would increase if a stronger path was forged from knowledge management to staff focus in the implementation of the QSM.

Structural equation modeling is a powerful and useful statistical tool for testing theoretical relationships among concepts. All of the paths shown in the Quality Schools structural model created from this research data have their basis in theoretical and empirical literature. However, the structural model showing the causal paths of the seven Baldrige factors in the implementation of the QSM was limited by the sample size. More causal paths may exist than could be shown with this research data. Another suggestion for further research would be to utilize all of the variables from the QSM practice scale to create subscales for use in a structural model and/or redrawing the model using the belief scale variables as a contrast to the practice scale model in this research.

Tabachnick and Fidell (2007) cautioned that results should only be generalized to the same type of sample that was used to estimate and test the SEM model. Rural schools as found in Alaska coincidentally share some similarities with the deliberate design of smaller learning communities in larger school districts, including a focus on shared leadership and vision. Therefore, further research could include a comparison or contrast of the QSM structural model with a structural model representing causal paths in a smaller learning community to validate some universal tenets that might predict successful reform.

Participation in this research was voluntary, and therefore the results may not represent the full range of viewpoints in the three districts. The results of this research could be regarded as a baseline, useful if the participating districts wanted to measure their implementation again at a later point or with a wider group of respondents. To increase the generalizability of the structural model, implementation would need to be measured in a larger group of school districts and with a larger participant group.

REFERENCES

Achinstein, B. (2002). Conflict amid community: The micropolitics of teacher collaboration. *Teachers College Record, 104*, 421–455.

Åkerström, M. (2006). Doing ambivalence: Embracing policy innovation—At arm's length. *Social Problems, 53*(1), 57–74.

Alaska Department of Education and Early Development. (2002). *History of Alaska school reform 1991–2002.* Juneau, AK: Author.

Alaska Native Knowledge Network. (1998). *Alaska standards for culturally responsive schools.* Fairbanks: University of Alaska Press.

Alaska State Advisory Committee to the U.S. Commission on Civil Rights. (2002, April). *Racism's frontier: The untold story of discrimination and division in Alaska.* Anchorage, AK: Author.

Alford, J. (2002). Why do public-sector clients coproduce? *Administration and Society, 34*(1), 32–56.

American Productivity and Quality Center. (1999). *Creating a knowledge-sharing culture.* Houston, TX: Author.

Archer, T. M. (2003). Web-based surveys. *Journal of Extension, 41*(4). Retrieved May 22, 2007, from http://www.joe.org/joe/2003august/tt6.shtml

Ardichvili, A., Page, V., & Wentling, T. (2002). Virtual knowledge-sharing communities of practice at Caterpillar: Success factors and barriers. *Performance Improvement Quarterly, 15*(3), 94–113.

Argote, L. (2005). *Organizational learning: Creating, retaining and transferring knowledge.* New York: Springer.

Argyris, C., & Schön, D. A. (1978). *Organizational learning: A theory of action perspective.* Reading, MA: Addison-Wesley.

Arrow, K. J. (1974). *The limits of organization.* New York: Norton.

Badri, M., Selim, H., Alshare, K., Grandon, E., Younis, H., & Abdulla, M. (2006). The Baldrige Education Criteria for Performance Excellence framework: Empirical test and validation. *The International Journal of Quality & Reliability Management, 23*(9), 1118.

Barnhardt, C. (1985). *Historical status of elementary schools in rural Alaska communities, 1867-1980.* Fairbanks, AK: Center for Cross-Cultural Studies.

Barnhardt, C. (2001). A history of schooling of Alaska Native people. *Journal of American Indian Education, 40*(1), 1–48.

Barnhardt, R. (1977) Administrative Influences in Alaskan Native Education. Cross-Cultural Issues in Alaskan Education. R. Barnhardt. Fairbanks, AK, Center for Cross-Cultural Studies, UAF. I: 57-63.

Barnhardt, R. (1992). Administration across cultures. In V. D'Oyley, A. Blunt, & R. Barnhardt (Eds.), *Education and development: Lessons from the Third World.* Calgary, AB: Temeron Press.

Barnhardt, R. (2005). Culture, community, and place in Alaska Native education. *Democracy and Education, 16*(2), 59–64.

Barnhardt, R., & Kawagley, A. O. (2005). Indigenous knowledge systems and Alaska Native ways of knowing. *Anthropology and Education Quarterly, 36*(1), 8–23.

Barta, J., Abeyta, A., Gould, E., Matt, G., Seaman, D., & Voggessor, G. (2001), The mathematical ecology of the Shoshoni and the implication for elementary mathematics education and the young learner. *Journal of American Indian Education*, 40(2), 1-27.

Beaulieu, D. L. (2000). Comprehensive reform and American Indian education. *Journal of American Indian Education, 39*(2), 29–38.

Beaulieu, D. (2006). A survey and assessment of culturally based education programs for Native American students in the United States. *Journal of American Indian Education, 45*(2), 50–61.

Benham Tye, B. (2000). *Hard truths: Uncovering the deep structure of schooling.* New York: Teachers College Press.

Berger, P. L., & Luckman, T. (1966). *The social construction of reality.* New York: Allyn and Bacon.

Bering Strait School District. (2008). *BSSD's instructional model (BSSD IM).* Retrieved January 18, 2008, from http://wiki.bssd.org/index.php/Stuff_for_new_hires_about_the_model

Berkowitz, S. (1997). Analyzing qualitative data. In J. Frechtling & L. Sharp (Eds.), *User-friendly handbook for mixed method evaluations*. Retrieved May 23, 2007, from http://www.ehr.nsf.gov/EHR/REC/pubs/NSF97-153/CHAP_4.HTM

Bernhardt, V. (2000). Intersections. *Journal of Staff Development, 21*(1), 33–36.

Bernhardt, V. (2003). No schools left behind. *Educational Leadership, 60*(5), 26–30.

Bernhardt, V. (2005). Data tools for school improvement. *Educational Leadership, 62*(5), 66–69.

Birkenshaw, J. (2001). Making sense of knowledge management. *Ivey Business Journal*, March-April, 32-36.

Bland, L. (1975). Visual perception and recall of school-age Navajo, Hopi, Jicarilla, Apache and Caucasian children of the Southwest including results form a pilot study among Eskimos and Athabascan school-age children of North Alaska. [Monograph #5]. Kennewick, WA: Human Environment Research Service.

Bogden, R. C., & Biklen, S. K. (2003). *Qualitative research for education: An introduction to theories and methods* (4th ed.). Boston: Allyn and Bacon.

Boisot, M. H. (1995). *Information space: A framework for learning in organizations, institutions, and culture.* London: Routledge.

Bou-Llusar, J.C., Escrig-Tena, A., Roca-Puig, V., & Beltrán-Martín, I. (2005). To what extent do enablers explain results in the EFQM excellence model? *The International Journal of Quality and Reliability Management, 22*(4/5), 337–353.

Boyers, K. (1996). Leading responsibly. *Association Management, 48*(12), 30–36.

Bracey, G. W. (2003). April foolishness: The 20th anniversary of *A Nation at Risk. Phi Delta Kappan, 84*, 616–621.

Bracey, G. W. (2006). The 16th Bracey Report on the condition of public education. *Phi Delta Kappan, 88*, 151–166.

Brien, S. J. (1992). The adult professional as graduate student: A case study in recruitment, persistence, and perceived quality. *Dissertation Abstracts International, 53* (07A), 2203. (UMI No. 1416)

Bryant, F., & Yarnold, P. (1995). Principal-components analysis and exploratory and confirmatory factor analysis. In L. Grimm & P. Yarnold, *Reading and understanding multivariate statistics* (pp. 99–136). Washington, DC: American Psychological Association.

Byrne, B. M. (2001). *Structural Equation Modeling with AMOS.* Mahwah, New Jersey: Lawrence Erlbaum Associates.

Cameron, K. S. (1986, January). A study of organizational effectiveness and its predictors. *Management Science, 32*(1), 87–112.

Campbell, C., & Fullan, M. (2006). *Unlocking the potential for district-wide reform.* Ontario, Canada: Ministry of Education, The Literacy and Numeracy Secretariat.

Casserly, M. (2005). [Interview with Hedrick Smith]. Retrieved November 7, 2007, from http://www.pbs.org/makingschoolswork/hyc/bor/warren.html

Cesari, J. P. (1990). Thesis and dissertation support groups: A unique service for graduate students. *Journal of College Student Development, 31*, 375–378.

Chandler, A. D. (1962). *Strategy and structure: Chapters in the history of the American industrial enterprise.* Cambridge, MA: MIT Press.

Cheskis-Gold, R., Loescher, R., Shepard-Rabadam, E., & Carroll, B. (2004, May–June). *Lessons from recent Web surveys at Harvard University.* Paper presented at the Annual Forum of the Association for Institutional Research, Boston, MA.

Cho, C., Kelleher, C., Wright, D., & Yackee, S. (2005). Translating national policy objectives into local achievements across planes of governance and among multiple actors: Second-order devolution and welfare reform implementation. *Journal of Public Administration Research and Theory, 15*(1), 31–54.

Choi, M. (2006). Communities of practice: An alternative learning model for knowledge creation. *British Journal of Educational Technology, 37*, 143–146.

Choo, C. W. (1998). *The knowing organization.* New York: Oxford University Press.

Chou, S. (2004). *The changing role of central office under site-based management. Dissertation Abstracts International, 65*(09A), p. 3225.

Chubb, J. E. (2001). The system. In T. E. Moe (Ed.), *A primer on America's schools* (pp. 15-42). Stanford, CA: Hoover.

Chubb, J. E., & Moe, T. M. (1990). *Politics, markets, and America's schools.* Washington, DC: The Brookings Institution.

Chudowsky, N., Kober, N., Gayler, K., & Hamilton, M. (2002). *State high school exit exams: A baseline report.* Washington, DC: Center for Education Policy.

Coalition of Essential Schools. (2002). *The common principles.* Retrieved January 17, 2007, from http://www.essentialschools.org/pub/ces_docs/about/phil/10cps/print10cps.html

Cobb, P., McClain, K., Lamberg, T., & Dean, C. (2003). Situating teachers' instructional practices in the institutional setting of the school and district. *Educational Researcher, 32*(6), 13–24.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly, 35*, 128–152.

Coladarci, T., Smith, L., & Whiteley, G. (2005). *The re-inventing schools implementation monitoring survey, Alaska benchmark/high school graduation qualifying examination data, and relationships between the two.* Anchorage, AK: ReInventing Schools Coalition.

Coleman, J. S. (1974). Excerpts from *Youth: Transition to Adulthood. NASSP Bulletin, 58*(385), 4–11.

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., et al. (1966). *Equality of educational opportunity.* Washington, DC: U.S. Government Printing Office.

Collier, D., Golstein, S. & Wilson, D. (2002). A thing of the past? The 1992 model may have been the best Baldrige model for organizational performance. *Quality Progress, 35*(10), pp. 97-104.

Collins, J. (2001). *Good to great.* New York: HarperCollins.

Congressional Institute. (2001, January). *Public opinion poll.* Storrs, CT: Roper Center for Public Opinion Research.

Cope, D., & Crumley, R. (2003). *Re-inventing schools implementation monitoring surveys: Leadership, shared vision, balanced instruction model, and continuous improvement.* Anchorage, AK: Re-Inventing Schools Coalition.

Corace, M. B. (2000). *The importance and application of the Malcolm Baldrige criteria in classrooms and its association with student outcomes Dissertation Abstracts International, 62* (01A), p. 32. (UMI No. 3001940)

Corbin, B., McNamara, O., & Williams, J. (2003). Numeracy coordinators: Brokering change within and between communities of practice. *British Journal of Educational Studies, 51*, 344–368.

Cotton, K. (2003). *Principals and student achievement: What the research says.* Alexandria, VA: Association for Supervision and Curriculum Development.

Cotton, S. E. (1984). Alaska's "Molly Hooch case": High schools and the village voice. *Educational Research Quarterly, 8*(4), 30–43.

Covey, S. R. (1989). *The seven habits of highly effective people.* New York: Simon and Schuster.

Crawford, S., McCabe, S. E., & Pope, D. (2005). Applying Web-based survey design standards. *Journal of Prevention and Intervention in the Community, 29*(1/2), 43–66.

Creamer, E. (2004). Collaborators' attitudes about differences of opinion. *The Journal of Higher Education, 75*, 556–571.

Creswell, J. (2003). *Research design: Qualitative, quantitative, and mixed method approaches.* Thousand Oaks, CA: Sage.

Cross, R., & Prusak, L. (2005). The political economy of knowledge markets in organizations. In M. Easterby-Smith & M. Lyles (Eds.), *The Blackwell handbook of organizational learning and knowledge management* (pp. 454–472). Malden, MA: Blackwell.

Cuban, L. (1990a). Cycles of history, equity versus excellence: Why do some reforms persist? In S. B. Bacharach (Ed.), *Education reform: Making sense of it all.* (Boston: Allyn and Bacon.

Cuban, L. (1990b). Reforming again, again, and again. *Educational Researcher, 19*(1), 3–13.

Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm.* Englewood Cliffs, NJ: Prentice-Hall.

Daghfous, A. (2004), Organizational learning, knowledge, and technology transfer: A case study, *The Learning Organization,* 11(1), 67-83.

Dale, L. (2003). *Perceived importance and implementation of the Baldrige criteria in selected schools on probation. Dissertation Abstracts International,* 64(10A), p. 3546. (UMI No. 3108555)

Dalkir, K. (2005). *Knowledge management in theory and practice.* Oxford, England: Elsevier Butterworth-Heinemann.

Darling-Hammond, L. (1996). Restructuring schools for high performance. In S. H. Fuhrman & J. A. O'Day (Eds.), *Rewards and reform: Creating educational incentives that work* (pp. 144–192). San Francisco: Jossey-Bass.

Darling-Hammond, L. (2006, January 2). Expert report, *Moore vs. State of Alaska.* Available at http://www.middletontimme.com/. Retrieved: 11/5/07.

Darling-Hammond, L., Davis, S., LaPointe, M., & Meyerson, D. (2005). *School leadership study: Developing successful principals*. Stanford, CA: Stanford University, Stanford Educational Leadership Institute.

Darnell, F. (1979). Education among the Native peoples of Alaska. *Polar Record 19* (122), 431-446.

Darnell, F., & Hoëm, A. (1996). *Taken to extremes: Education in the Far North.* Oslo, Norway: Scandinavian University Press.

Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know.* Boston: Harvard Business School Press.

Deming, W. E. (2000). *Economics for industry, government, and education.* Cambridge, MA: MIT Press.

Demmert, W. G., Grissmer, D., & Tower, J. (2006). A review and analysis of the research on Native American students. *Journal of American Indian Education, 45*(3), 5–23.

Demmert, W., McCardle, P., Mele-McCarthy, J., & Leos, K. (2006). Preparing Native American children for academic success: A blueprint for research. *Journal of American Indian Education, 45*(3), 92–106.

Department of Education Organization Act, Pub. L. No. 96-88, § 319 (1980).

Derry, S., & DuRussel, L. (2000, July). *Assessing knowledge construction in on-line learning communities*. Paper presented at the Annual Meeting of the International Society for Artificial Intelligence in Education, Lemans, France.

Detert, J. R., Kopel, M. E. B., Mauriel, J. J., & Jenni, R. W. (2000). Quality management in U.S. high schools: Evidence from the field. *Journal of School Leadership, 10*, 158–187.

Dixon, N. (2000). *Common knowledge.* Boston: Harvard Business School Press.

Dorn, S. M., & Papalewis, R. (1997, March). *Improving doctoral student retention.* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Drucker, P. (2001). *Management: Tasks, Responsibilities, Practices.* Woburn, MA: Butterworth-Heinemann.

Duffy, F. M. (2003). Courage, passion, and vision: A guide to leading systemic school improvement. *International Journal of Education Reform, 11*(1), 63–76.

DuFour, R., DuFour, R., Eaker, R., & Many, T. (2006). *Learning by doing: A handbook for professional learning communities at work.* Bloomington, IN: Solution Tree.

Easterby-Smith, M., & Lyles, M. (Eds.). (2005). *Handbook of organizational learning and knowledge management.* Malden, MA: Blackwell.

Edmonds, R. R., & Frederickson, J. R. (1979). *Search for effective schools: The identification and analysis of city schools that are instructionally effective for poor children.* (ERIC Document Reproduction Service No. ED170396). Available at http://eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=ED170396&ERICExtSearch_SearchType_0=no&accno=ED170396. Last retrieved on 5/15/08.

Edwin, J. A. (2007). *An evaluation of a military family support program: The case of Operation: Military Kids in Indiana.* Unpublished doctoral dissertation, Purdue University, Indiana.

Eglene, O. (2007). Authority and leadership patterns in public sector knowledge networks. *American Review of Public Administration, 37*(1), 91–113.

Eisner, E. W. (1998). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice.* Upper Saddle River, NJ: Prentice-Hall.

Eisner, E. W. (2004). Multiple intelligences: Its tensions and possibilities. *Teachers College Record, 106,* 31–39.

Elmore, R. F., & Fuhrman, S. H. (1995). Opportunity-to-learn standards and the state role in education. *Teachers College Record, 96,* 432–457.

English, F. W., & Steffy, B. E. (2001). *Deep curriculum alignment.* Lanham, MD: Scarecrow Press.

Evans, J. R., & Jack, E. P. (2003). Validating key results linkages in the Baldrige Performance Excellence Model. *Quality Management Journal, 10*(2), 7–24.

Fuhrman, S. H. (Ed.). (1993). *Designing coherent education policy: Improving the system.* San Francisco: Jossey-Bass.

Fullan, M. G. (2001a). *Leading in a culture of change.* San Francisco: Jossey-Bass.

Fullan, M. G. (2001b). *The new meaning of educational change* (3rd ed.). New York: Teachers College, Columbia University.

Fullan, M. G. (2003). *Change forces with a vengeance.* London: RoutledgeFalmer.

Gales, L. (2000). *What are the most common errors found in Web design?* Retrieved May 22, 2007, from University of Washington Computing and Communications Web site: http://staff.washington.edu/larryg/Classes/Rinflux/zz-influx.html#Errors

Gall, M., Borg, W., & Gall, J. (1996). *Educational research: An introduction* (6th ed.). White Plains, NY: Longman.

Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction* (8th ed.). White Plains, NY: Longman.

Garson, G. David (n.d.). "Structural Equation Modeling", from Statnotes: Topics in Multivariate Analysis. Retrieved February 6, 2007 from http://www2.chass.ncsu.edu/garson/pa765/statnote.htm

Gearing, F. O. (1968). The structural poses of 18th-century Cherokee villages. In Y. A. Cohen (Ed.), *Man in adaptation: The cultural present* (pp. 153-159). Chicago: Aldine.

Gemberling, K. W., Smith, C. W., & Villani, J. S. (2004). *Leading change: The case for continuous improvement.* Alexandria, VA: National School Boards Association.

General Accounting Office. (1998). *Goals 2000: Flexible funding supports state and local education reform.* Washington, DC: U.S. Government Printing Office.

Glasser, W. (1998). *The quality school* (rev. ed.). New York: Harper Perennial.

Glatthorn, A. A., & Joyner, R. L. (1998). *Writing the winning thesis or dissertation: A step-by-step guide.* Thousand Oaks, CA: Corwin Press.

Glickman, V. (2005). *What counts: Education knowledge management practices. Dissertation Abstracts International, 66*(2A), p. 425.

Good, T. L., & Brophy, J. E. (1985). *School effects* (Occasional Paper No. 77). East Lansing: Michigan State University, The Institute for Research on Teaching.

Gorden, R. L. (1992). *Basic interviewing skills*. Long Grove, IL: Waveland Press.

Greymorning, S. (2000). Culture and language: The political realities to keep trickster at bay. *Canadian Journal of Native Studies, 20(1),* 181-196.

Greene, J. C., Caracelli, V. J., & Graham, W. D. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*, 255–274.

Groves, R. M., Fowler, F .J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2004). *Survey methodology*. Hoboken, NJ: Wiley.

Guthrie, J. W., & Springer, M. G. (2004). *A Nation at Risk* revisited: Did "wrong" reasoning result in "right" results? At what cost? *Peabody Journal of Education, 79*(1), 7–35.

Gutierrez, R., & Slavin, R. (1992). *The achievement effects of the nongraded elementary school* (Report No. 33). Baltimore: John Hopkins University, Center for Research on Effective Schooling for Disadvantaged Students.

Hackman, J. R., & Wageman, R. (1995). Total Quality Management: Empirical, conceptual, and practical issues. *Administrative Science Quarterly, 40*, 309–342.

Hall, M. (1991). Gadugi: A model of service-learning for Native American communities. *Phi Delta Kappan.* 72(10), 754-757.

Hansen, M. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly, 44*, 82–111.

Hanson, M. J., & Lynch, E. W. (1990). Honoring the cultural diversity of families when gathering data. *Topics in Early Childhood Special Education, 10*(1), 112–132.

Hanushek, E. A. (1998). Conclusions and controversies about the effectiveness of school resources. *Educational Policy Review, 4*(1), 11–28.

Hargreaves, A. (1992). Time and teachers' work: An analysis of the intensification thesis. *Teachers College Record, 94*, 86–108.

Hargreaves, A. (1997). *Rethinking educational change with heart and mind/1997 ASCD yearbook.* Reston, VA: Association for Supervision and Curriculum Development.

Hargreaves, A., & Fink, D. (2000). The three dimensions of reform. *Educational Leadership, 57*(7), 30–34.

Heath, S.B. (1983). *Ways with words: Language, life, and work in communities and classrooms.* Cambridge: Cambridge University Press.

Hilberg, R. S., & Tharp, R. G. (2002). *Theoretical perspectives, research findings, and classroom implications of the learning styles of American Indian and Alaska Native students*. Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools. (ERIC Document Reproduction Service No. ED468000)

Hill, H. (2003). Understanding Implementation: Street level bureaucrats' resources for reform. *Journal of Public Administration Research and Theory, 13*(3), 265 – 282.

Hjern, B., & Porter, D. O. (1981). Implementation structures: A new unit of administrative analysis. *Organization Studies, 2*, 211–227.

Hlebowitsh, P. S. (1990). Playing power politics: How *A Nation at Risk* achieved its national stature. *Journal of Research and Development in Education, 23*(2), 82–88.

Hofstede, G. (1991). *Cultures and organizations.* London: Harper Collins Business.

Holt, M. (1993). Dr. Deming and the improvement of schooling: No instant pudding. *Journal of Curriculum and Supervision, 9*(1), 6–23.

Honig, M. (2006). Street-level bureaucracy revisited: Frontline district central-office administrators as boundary spanners in education policy implementation. *Educational Evaluation and Policy Analysis, 28*, 357–383.

Hoyer, R. W., & Hoyer, B. B. Y. (2001). What is quality? *Quality Progress, 34*(7), 52–62.

Hunt, S. L., & Staton, A. Q. (1996). The communication of educational reform: *A Nation at Risk. Communication Education, 45*, 271–292.

Ingram, D., Seashore, K. L., & Schroeder, R. G. (2004). Accountability policies and teacher decision making: Barriers to the use of data to improve practice. *Teachers College Record, 106*, 1258–1287.

Institute of Social and Economic Research. (2005). *Kids Count Alaska 2005.* Retrieved December 8, 2007, from University of Alaska Anchorage Web site: http://kidscount.alaska.edu/2005db/2005db.htm

James, L. R., Mulaik, S.A. & Brett, J. M. (1982). *Causal Analysis: Assumptions, Models, and Data.* Beverly Hills, CA: Sage Publications, Inc.

Jennings, J., & Rentner, D. S. (2006). Ten big effects of the No Child Left Behind Act on public schools. *Phi Delta Kappan, 88,* 110–113.

Jester, T. E. (2001). *Standards-based educational reform: Encounters in rural Alaska. Dissertation Abstracts International,* 62(5A), p. 1706.

Jester, T. E. (2002). Healing the "unhealthy native": Encounters with standards-based education in rural Alaska. *Journal of American Indian Education, 41*(3), 1–21.

Jester, T. E. (2005). Transfer of standards-based education in rural Alaska: An analysis of the politics of educational transfer in the Tikishla School District. *Teachers College Record, 107,* 862–893.

Johnson, L. B. (1965, April 9). *Remarks following enactment of the Elementary and Secondary Education Bill.* Retrieved December 28, 2007, from http://www.presidency.ucsb.edu/ws/index.php?pid=26883

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed-methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14–26.

Juran, J. M., & Godfrey, A. B. (1999). *Juran's quality handbook* (5th ed.). New York: McGraw-Hill.

Kane, C. M. (1994). *Prisoners of time: Research. What we know and what we need to know.* Washington, DC: National Education Commission on Time and Learning.

Kannapel, P. J., & Clements, S. K. (2005). *Inside the black box of high-performing high-poverty schools: A report from the Prichard Committee for Academic Excellence.* Lexington, KY: Prichard Committee for Academic Excellence.

Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard.* Boston: Harvard Business School Press.

Karns, M. (2005). Creating prosocial learning communities. *Leadership, 34*(5), 32–36.

Kawagley, A. O. (1995). *A Yupiaq worldview: A pathway to ecology and spirit.* Prospect Heights, IL: Waveland Press.

Kiernan, M. E. (2005). Is a Web survey as effective as a mail survey? A field experiment among computer users. *American Journal of Evaluation, 26*, 245–252.

Kirk, R. (1992). The big picture: Total Quality Management and continuous quality improvement. *Journal of Nursing Administration, 22*(4), 24–31.

Kleinfeld, J., & Nelson, P. (1991). Adapting instruction to Native Americans' learning styles: An iconoclastic view. Journal of Cross-Cultural Psychology, 22(2), 273-282.

Klitgaard, R. E., & Hall, G. R. (1974). Are there unusually effective schools? *Journal of Human Resources, 74*, 90–106.

Knowles, E. (1997). Ocean waves. In E. Knowles, *Introductory oceanography* (chapter 10). Retrieved February 4, 2007, from North Carolina State University Web site: http://www4.ncsu.edu/eos/users/c/ceknowle/public/chapter10/part3.html

Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science, 3*, 383–397.

Kostova, T. (1999). Transnational transfer of strategic organizational practices: A contextual perspective. *Academy of Management Review, 24*, 308–324.

Kushman, J. W., & Barnhardt, R. (1999). *Study of Alaska rural systemic reform: Final report*. Portland, OR: Northwest Regional Laboratory.

Kushman, J. W., & Barnhardt, R. (2001). Reforming education from the inside out: A study of community engagement and educational reform in rural Alaska. *Journal of Research in Rural Education, 17*(1), 12–26.

Learning Center. (2002). *Organizational assessment, and leadership assessment surveys*. San Rafael, CA: Author. Retrieved February 20, 2007, from http://www.learningcenter.net/library/management.shtml and http://www.learningcenter.net/library/leadership.shtml

Leinonen, P., & Järvelä, S. (2006). Facilitating interpersonal evaluation of knowledge in a context of distributed team collaboration. *British Journal of Educational Technology, 37*, 897–916.

Leithwood, K., Jantzi, D., Coffin, G., & Wilson, P. (1996). Preparing school leaders: What works? *Journal of School Leadership, 6*(3), p. 316-342.

Leithwood, K., Seashore-Louis, K., Anderson, S., & Wahlstrom, K. (2004). *Executive summary: How leadership influences student learning*. New York: The Wallace Foundation.

Leonard-Barton, D. (1998). *Wellsprings of knowledge.* Boston: Harvard Business School Press.

Levine, A. (2005). *Educating school leaders*. New York: Columbia University, Teachers College, Education Schools Project.

Levine, D. U., & Lezotte, L. W. (1990). *Unusually effective schools: A review and analysis of research and practice.* Madison, WI: The National Center for Effective Schools Research and Development.

Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology. 14*, 319–340.

Lezotte, L. W. (1991). *Correlates of effective schools: The first and second generation.* Okemos, MI: Effective Schools Products.

Lezotte, L. W. (2003). *Revolutionary* and *evolutionary: The effective schools movement*. Retrieved January 17, 2007, from http://www.effectiveschools.com/downloads/RevEv.pdf

Liebowitz, J., & Wilcox, L. (1997). *Knowledge management and its integrative elements*. Boca Raton, FL: CRC Press.

Lincoln, Y. & Guba, E. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications, Inc.

Lindsey, R., Robins, K., & Terrell, R. (2003). *Cultural proficiency: A manual for school leaders.* Thousand Oaks, CA: Corwin Press.

Lipiniski, T.A., (1989). The role of vocational counseling for the American Indian student. *Rural Special Education Quarterly*, 10(1), 31-37.

Lipiniski, T.A., (1990). Visiospatial and verbal-sequential performance for rural remote Alaskan Native, Urban Alaskan Native, and Urban Alaskan white male children. *Research in Rural Education*, 6(3), 43-47.

Lipka, J., Sharp, N., Adams, B., & Sharp, F. (2007). Creating a third space for authentic biculturalism: Examples from Math in a Cultural Context. *Journal of American Indian Education, 46*(3), 94–115.

Lipka, J., Sharp, N., Brenner, B., Yanez, E., & Sharp, F. (2005). The relevance of culturally based curriculum and instruction: The case of Nancy Sharp. *Journal of American Indian Education, 44*(3), 31–54.

Lipsky, M. (1980). *Street-level bureaucracy.* New York: Sage.

MacDougal,, A. F. (1928). Ch. 3, *The Autobiography of a Businesswoman.*

Mace-Matluck, B. J. (1986). *Research-based strategies for bringing about successful school improvement.* Austin, TX: Southwest Educational Development Laboratory.

March, J.G. (1991). Exploration and exploitation in organizational learning. *Organizational Science, 2*(1), 71-87.

March, J. G., & Simon, H. A. (1993). *Organizations* (2nd ed.). Oxford, UK: Blackwell.

Marzano, R. J. (2005, September). *Final report on Reinventing Schools Coalition.* Anchorage, AK: ReInventing Schools Coalition.

Marzano, R. J., Waters, T., & McNulty, B. A. (2005). *School leadership that works: From research to results.* Aurora, CO: Mid-Continent Research for Education and Learning.

Maxwell, D. (1998). *Can qualitative and quantitative methods serve complementary purposes for policy research? Evidence from ACCRA* (FCND Discussion Paper No. 40). Washington, DC: Food Consumption and Nutrition Division, International Food Policy Research Institute.

Maynard-Moody, S., & Musheno, M. (2003). *Cops, teachers, counselors: Stories from the front lines of public service.* Ann Arbor: University of Michigan Press.

Maynard-Moody, S., Musheno, M. & Palumbo, D. (1990). Street-wise social policy: Resolving the dilemma of street-level influence and successful implementation. *The Western Political Quarterly, (43)*4, 833-848.

McDowell Group. (2001). *Alaska Native education study: A statewide study of Alaska Native values and opinions regarding education in Alaska.* Anchorage, AK: First Alaskans Foundation.

McDowell Group. (2004). *Our choices, our future: Analysis of the status of Alaska Natives Report 2004.* Anchorage, AK: First Alaskans Foundation.

McIvor, M. (1999). Redefining science education for aboriginal students. In M. Battiste& J. Barman (Eds.), *First Nations' education in Canada: The circle unfolds* (pp. 73-98). Vancouver, BC: University of British Columbia Press.

McKinney, B. (2003). *Alaska's Quality Schools Initiative: A description and analysis of 51 schools; perceived strengths and weaknesses in factors associated with organizational change. Dissertation Abstracts International,* 65(01A), 60. (UMI No. 3118716)

McMillan, J. H., & Schumacher, S. (2001). *Research in education: A conceptual introduction.* New York: Addison Wesley Longman.

McShane, D.A., & Plas, J.M. (1994). Wechsler scale performance patterns of American Indian children. *School Psychology Review*, 13(1), 8-17.

Miller, L. J. (1996). *School District Quality Profile: Development of an instrument to measure baseline quality performance derived from the Malcolm Baldrige National Quality Award Criteria.* Dissertation Abstracts International, 57 (12A), p. 5005. (UMI No. 9716272)

Miller, W. D. (2000). *An inquiry into the exigency of a beginning doctoral cohort in educational leadership.* Huntsville, TX: Sam Houston State University.

Modic, S. J. (2006). Peter F. Drucker leaves us a legacy of profound ideas. *Tooling and Production, 72*(2), 10–12.

Mohrman, S. A., & Wohlstetter, P. (Eds.). (1994). *School-based management: Organizing for high performance.* San Francisco: Jossey-Bass.

Mulaik, S. A. (1987). A brief history of the philosophical foundations of exploratory factor analysis. *Multivariate Behavioral Research, 22*, 267-305.

Murphy, J., & Hallinger, P. (Eds.). (1993). *Restructuring schooling: Learning from ongoing efforts.* Newbury Park, CA: Corwin Press.

National Center for Education Statistics. (2004). *Principal questionnaire, schools and staffing survey, 2003–2004* (OMB No. 1850-0598). Washington, DC: U.S. Department of Education.

National Commission on Excellence in Education. (1983). *A nation at risk.* Washington, DC: U.S. Department of Education. Retrieved January 18, 2008, from http://www.ed.gov/pubs/NatAtRisk/index.html

National Council of Teachers of Mathematics. (1989). *Curriculum and evaluation standards for school mathematics.* Reston, VA: Author.

National Council of Teachers of Mathematics. (1991). *Professional standards for teaching mathematics.* Reston, VA: Author.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics.* Reston, VA: Author.

National Education Association. (2004). *Keys to excellence for your school: 35 indicators of a quality school.* Washington, DC: Author.

National Institute of Standards and Technology. (2000, December). Baldrige Index beats the market by nearly 5 to 1. *Baldrige National Quality Program CEO Issue Sheet*, 1–2.

National Institute of Standards and Technology. (2005). *Baldrige organizational effectiveness questionnaire*. Gaithersburg, MD: Author.

National Institute of Standards and Technology, The Baldrige National Quality Program. (2006). *Education criteria for performance excellence*. Gaithersburg, MD: Author.

Nelson, R., & Winter, S. (1982). *An evolutionary theory of economic change.* Cambridge, MA: Belknap Press.

New Commission on the Skills of the American Workforce. (2007). *Tough choices or tough times.* Washington, DC: National Center on Education and the Economy.

Newmann, F. M., & Clune, W. H. (1992, Summer). *When school restructuring meets systemic curriculum reform* (Brief to policymakers). Madison: Center on Organization and Restructuring of Schools, Wisconsin Center for Education Research, University of Wisconsin.

Newmann, F. M., & Wehlage, G. G. (1995). *Successful school restructuring: A report to the public and educators.* Madison: Center on Organization and Restructuring of Schools, Wisconsin Center for Education Research, University of Wisconsin.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organizational Science, 5*(1), 14–37.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge creating company.* Oxford, England: Oxford University Press.

Norman, K. L. (n.d.). *Guidelines: Web-based questionnaires*. Retrieved May 22, 2007, from University of Maryland, Laboratory for Automation Psychology Web site: http://lap.umd.edu/survey_design/questionnaires.html

North Central Regional Educational Laboratory. (2005). *Characteristics of successful schools surveys: Vision, leadership, high academic standards, standards of the heart, family, school, and community partnerships, professional development, and evidence of success*. Naperville, IL: Learning Point Associates. Retrieved February 20, 2007, from http://www.ncrel.org/datause/css/results.php

Nowlis, S., Kahn, B., & Dhar, R. (2002). Indifference versus ambivalence: The effect of a neutral point on consumer attitude and preference judgment. *Journal of Consumer Research, 29*, 319–334.

O'Dell, C., & Grayson, C. J. (1998). *If only we knew what we know.* New York: Free Press.

Office of Education Research and Improvement. (1994). *Changing education: Resources for systemic reform.* Washington, DC: Author.

O'Leary, D. (1998). Using AI in knowledge management: Knowledge bases and ontologies. *IEEE Intelligent Systems, 13*, 34–39.

O'Neil, J. (1995). On lasting school reform: A conversation with Ted Sizer. *Educational Leadership, 52*(5), 4–9.

Ogbu, J. (1987). Variability in minority school performance: A problem search of an explanation. *Anthropology and Education Quarterly*, 18, 312-334.

Osland, J. S., & Bird, A. (2000). Beyond sophisticated stereotyping: Cultural sensemaking in context. *Academy of Management Executive, 14*(1), 65–79.

Osthoff, E. (2003). External influences on school restructuring for authentic achievement. *Dissertation Abstracts International, 64* (11A), 4007. (UMI No. 3113649)

Ouchi, W. G., Cooper, B. S., Segal, L. G., DeRoche, T., Brown, C., & Galvin, E. (2003, May 30). *Organizational configuration and performance: The case of primary and secondary school systems* (Working paper draft). Los Angeles: University of California, Los Angeles, The Anderson School of Management.

Paavola, S., Lipponen, L., & Hakkarainen, K. (2004). Models of innovative knowledge communities and three metaphors of learning. *Review of Educational Research, 74*, 557–576.

Pallant, J. (2007). *SPSS survival manual* (3rd ed.). Berkshire, England: Open University Press.

Pannirselvam, G. & Ferguson, L. (2001). A study of the relationships between the Baldrige categories. *The International Journal of Quality & Reliability Management, 18*(1),14– 34.

Patton, M. Q. (1987). *How to use qualitative methods in evaluation.* Thousand Oaks, CA: Sage.

Peters, T. (1987). *Thriving on chaos.* London: Pan Books.

Pewewardy, C. (2002). Learning styles of American Indian/Alaska Native students: A review of the literature and implications for practice. *Journal of American Indian Education, 41*(3), 22–56.

Phillips-Donaldson, D. (2004). 100 Years of Juran. *Quality Progress, 37*(5), 25–39.

Polanyi, M. (1966). *The tacit dimension.* London: Routledge and Kegan Paul.

Porter, D. O. (1990). Structural pose as an approach for implementing complex programs. In M. Mandell & R. Gage (Eds.), *Strategy for managing intergovernmental policies and networks* (pp. 3–28). New York: Praeger.

Porter, D. O. (2006). *Impact of new strategies for the delivery of education services on institutional arrangements.* Paper presented at the Workshop in Political Theory and Policy Analysis, Indiana University, Bloomington.

Porter, D. O. (2007, July). *Structuring institutions for a radical new strategy in public education.* Paper presented at the Congress of Political Economists International, 18th Annual Meeting, Berlin, Germany.

Poston, W. K. (1997). Comprehensive study of factors impacting perceived quality in school organizations: Findings from research on quality assessment in Iowa school districts. *Education Policy Analysis Archives, 5*(19), 1–45.

Putnam, L., Phillips, N., & Chapman, P. (1996). Metaphors of communication and organization. In S. Clegg, C. Hardy, & W. Nord (Eds.), *Handbook of organizational studies* (pp. 375–408). London: Sage.

Ravitch, D. (1996). The case for national standards and assessment. *The Clearing House, 69*, 134–136.

Reagle, C. M. (2007). *Examining community voice in implementing the Quality Schools Model in the Bering Strait School District. Dissertation Abstracts International* 68(03A), 847.

Reid, L. (1992). Continuous improvement through process management: It's not enough to tell your employees to work harder and smarter, you have to show them how to improve. *Management Accounting* 74, (3), 37-40.

Richardson, S. (1753). Harriet Byron, in Sir Charles Grandison, Vol. 1, letter 11, Oxford University Press.

Riley, R. (1995). Reflections on Goals 2000. *Teachers College Record, 96,* 380–388.

Rogers, E. M. (1994). *A history of communication study: A biographical approach.* New York: Free Press.

Roosevelt, T. (1903). Labor Day speech, September 7, 1903. Syracuse, NY.

Rothstein, R., Jacobsen, R., & Wilder, T. (2006, November 29). "Proficiency for all" is an oxymoron. *Education Week, 26,* (13), November 29, 2006.

Sachman, S. A. (1992). Culture and subcultures: An analysis of organizational knowledge. *Administrative Science Quarterly, 37,* 140–161.

Sallis, E. (1996). *Total Quality Management in education.* 2nd Ed. London: Kogan Page.

Salter, L., & Hearn, A. (1996). *Outside the lines: Issues in interdisciplinary research.* Montreal, Canada: McGill-Queen's University Press.

Samson, D., & Terziovski, M. (1999). The relationship between total quality management practices and operational performance. *Journal of Operational Management, 17,*393-409.

Sandholtz, J. H., Ogawa, R. T., & Scribner, S. P. (2004). Standards gaps: Unintended consequences of local standards-based reform. *Teachers College Record, 106,* 1177–1202.

Sarason, S. B. (1990). *The predictable failure of education reform: Can we change course before it's too late?* San Francisco: Jossey-Bass.

Schlechty, P. C. (2001) Shaking up the schoolhouse: How to support and sustain educational innovation. San Francisco: Jossey-Bass.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action.* New York: Basic Books.

Schreiber, J., Stage, F., King, J., Nora, A., & Barlow, E. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *Journal of Educational Research, 99,* 323–338.

Schreiber, R., & Battino, W. (Eds.). (2002). *A guide to reinventing schools.* Anchorage, AK: Chugach School District.

Schwab, D. (1999). *Research methods for organizational studies.* Mahwah, NJ: Lawrence Erlbaum.

Scollon, R., & Scollon, S. (1981). *Narrative , literacy, and face in interethnic communication.* New Jersey: Ablex Publishing Company.

The Secretary's Commission on Achieving Necessary Skills. (1991, June). *What work requires of schools.* Washington, DC: U.S. Department of Labor.

Senge, P.(1990). *The Fifth Discipline: The art & practice of the learning organization.* New York, NY: Doubleday.

Senge, P., Cambron-McCabe, N., Lucas, T., Smith, B., Dutton, J., & Kleiner, A. (2000). *Schools that learn.* New York: Doubleday.

Senge, P., Kleiner, A., Roberts, C., Ross, R., Roth, G., & Smith, B. (1999). *The dance of change.* New York: Doubleday.

Shakespeare, W. (1609). *Pericles*, Act 3, scene 4, line 17-18.

Simon, H. A. (1957). *Models of man: Social and rational.* New York: Wiley.

Simon, H. A. (1997). *Administrative behavior: A study of decision-making processes in administrative organizations* (4th ed.). New York: Free Press.

Sizer, T. R. (1984). *Horace's Compromise: The dilemma of the American high school.* Boston: Houghton Mifflin.

Sizer, T. R. (1992). *Horace's School: Redesigning the American high school.* Boston: Houghton Mifflin.

Sizer, T. R. (2003, April 23). Two reports. *Education Week, 22*, 24.

Solomon, D. J. (2001) *Conducting Web-based surveys.* College Park, MD: ERIC Clearinghouse on Assessment and Evaluation. (ERIC Document Reproduction Service No. ED458921)

Southern Minnesota Initiative Foundation. (2003). Understanding organizational success: A self-assessment tool for nonprofit organizations. Owatonna, MN: Author.

Sparks, D. (1993). Insights on school improvement: An interview with Larry Lezotte. *Journal of Staff Development, 14*(3), 18–21.

Stairs, A. (1999). Learning processes and teaching roles in Native education: Cultural base and cultural brokerage. In M. Battiste & Jean Barman (Eds.), *First Nations education in Canada: The circle unfolds* (pp. 139-153). Vancouver, BC: University of British Columbia Press.

Stapleton, C. (1997, January). *Basic concepts and procedures of confirmatory factor analysis*. Paper presented at the Annual Meeting of the Southwest Educational Research Association, Austin, TX. Retrieved May 25, 2008 from http://ericae.net/ft/tamu/Cfa.htm.

Steinhauer, E. (2002). Thoughts on an indigenous research methodology. *Canadian Journal of Native Education, 26*(2), 69-81.

Stellern, J., Collins, J., Gutierrez, B., & Patterson, E. (1986). Hemispheric dominance of Native American Indian students. *Journal of American Indian Education, 25*(2), 8-17.

Sternberg, R. J. (2001). Epilogue: Another mysterious affair at styles. In R. J. Sternberg & L. F. Shang (Eds.), *Perspectives on thinking, learning, and cognitive styles* (pp. 249–252). Mahwah, NJ: Lawrence Erlbaum.

Sternberg, R. J. (2006). Recognizing neglected strengths. *Educational Leadership, 64*(1), 30–35.

Stewart, T. A., & Juran, J. M. (1999, January 11). A conversation with Joseph Juran. *Fortune, 139*, 168–170.

Stohl, C., & Redding W. C. (1987). Messages and message exchange process. In F. Jablin, L. Putnam, K. Roberts, & L. Porter (Eds.), *Handbook of organizational communication: An interdisciplinary perspective* (pp. 451–502). Beverly Hills, CA: Sage.

Sun, J. (2005). Assessing goodness of fit in confirmatory factor analysis. *Measurement and Evaluation in Counseling and Development, 37*, 240–256.

Sundre, S. M., & Raisch, C. D. (2002). What would Peter Drucker say? *School Administrator, 59*(4), 32–33.

Superfine, B. M. (2005). The politics of accountability: The rise and fall of Goals 2000. *American Journal of Education, 112*, 10–43.

Supovitz, J., & Christman, J. (2005). Small learning communities that actually learn: Lessons for school leaders. *Phi Delta Kappan, 86*, 649–651.

Sveiby, K., & Simmons, R. (2002). Collaborative climate and effectiveness of knowledge work—An empirical study. *Journal of Knowledge Management, 6*, 420–433.

Sydenstricker-Neto, J. (1997). *Research design and mixed-methods approach: A hands on experience.* Retrieved March 23, 2007, from http://www.socialresearchmethods.net /tutorial/Sydenstricker/bolsa.html

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal, 17*, 27–43.

Szulanski, G. (2003). *Sticky knowledge.* Thousand Oaks, CA: Sage.

Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education.

Takeuchi, H., & Shibata, T. (2006). *Japan, moving toward a more advanced knowledge economy.* Washington, DC: The World Bank.

Tanaka, J. (1993). Multifaceted conceptions of fit in structural equation models. In K. Bollen & J. Long (Eds.), *Testing structural equation models* (pp. 10–39). Newbury Park, CA: Sage.

Taylor, S., & Osland, J. (2003). The impact of intercultural communication on global organizational learning. In M. Easterby-Smith & M. Lyles (Eds.), *Handbook of organizational learning and knowledge management* (pp. 212-232). Malden, MA: Blackwell.

Teigland, M. D. (1993). *A study of the beliefs for Total Quality Management comparing superintendents, board members, and classroom teachers in Iowa schools. Dissertation Abstracts International* 54(03A): 0769. (UMI No. 9321218)

Tesch, R. (1990). *Qualitative research: Analysis types and software tools*. New York: Falmer.

Tharp, R.G. (1989). Psychocultural variables and constants: Effects on teaching and learning in schools. *American Psychologist*, 44(2), 349-359.

Tharp, R. G. (2006). Four hundred years of evidence: Culture, pedagogy, and Native America. *Journal of American Indian Education, 45*(2), 6–25.

Tharp, R.G., & Yamauchi, L.A. (1994). *Effective instructional conversation in Native American classrooms (Educational Practice Report No. 10).* Santa Cruz, CA and Washington, DC: National Center for Research on Cultural Diversity and Second Language Learning.

Thomas, D. (2003, August). *A general inductive approach for qualitative analysis.* Retrieved February 10, 2008, from the University of Auckland, New Zealand School of Population Health web site: http://www.health.auckland.ac.nz/hrmas/resources/Inductive2003.pdf

Thompson, J. D. (2003). *Organizations in action: Social science bases of administrative theory.* New Brunswick, NJ: Transaction.

Tinto, V. (1988). Stages of student departure: Reflections on the longitudinal character of student leaving. *Journal of Higher Education, 59,* 438–455.

Tomsic, M. L., Hendel, D. D., & Matross, R. R. (2000, May). *A World Wide Web response to student satisfaction surveys: Comparing using paper and Internet formats.* Paper presented at the Annual Meeting of the Association for International Research, Cincinnati, OH.

Tucker, M. S., & Codding, J. B. (1998). *Standards for our schools: How to set them, measure them, and reach them.* San Francisco: Jossey-Bass.

Tufte, E. R. (2001). *The visual display of quantitative information.* Cheshire, CT: Graphics Press.

U.S. Department of Education, Office of the Under Secretary. (2004). *Implementation and early outcomes of the Comprehensive School Reform Demonstration (CRDC) Program.* Washington, DC: Author.

Vera, D., & Crossan, M. (2005). Organizational learning and knowledge management: Toward an integrative framework. In M. Easterby-Smith & M. Lyles (Eds.), *Handbook of organizational learning and knowledge management* (pp. 122–141). Malden, MA: Blackwell.

Viteritti, J. P. (2004). From excellence to equity: Observations on politics, history, and policy. *Peabody Journal of Education, 79*(1), 64–86.

Von Krogh, G., Ichijo, K., & Nonaka, I. (2000). *Enabling knowledge creation: How to unlock the mystery of tacit knowledge and release the power of innovation.* Oxford, England: Oxford University Press.

Vygotsky, L. S. (1986). The genetic roots of thought and speech. In A. Kozulin (Trans. & Ed.), *Thought and language.* Cambridge, MA: MIT Press.

Vygotsky, L. (1988). *Thought and language.* Cambridge, MA: The MIT Press.

Vygotsky, L. (1994). The problem of the cultural development of the child. In R. Van Der Veer, & J. Valsiner (Eds.). *The Vygotsky Reader.* Cambridge, MA: Blackwell Publishers.

Walonick, D. (2004). *Survival statistics.* Bloomington, MN: StatPac.

Walpole, M., & Noeth, R. J. (2002). *The promise of Baldrige for K–12 education.* Iowa City, IA: American College Testing Program.

Watson, G. H. (2002). Peter F. Drucker: Delivering value to customers. *Quality Progress, 35*(5), 55–61.

Weber-Pillwax, C. (1999). Indigenous research methodology: Exploratory discussion of an elusive subject. *Journal of Educational Thought, 33*(1), 31-45.

Weick, K. E. (1976). Education organizations as loosely coupled systems. *Administrative Science Quarterly, 21*, 1–19.

Wesson, L., Holman, S., Holman, D., & Cox, D. (1996, April). *Cohesion or collusion: Impact of a cohort structure on educational leadership doctoral students.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.

Wheatley, M. J. (1999). *Leadership and the new science.* San Francisco: Berrett-Koehler.

Whitaker, G. P. (1980). Coproduction: Citizen participation in service delivery. *Public Administration Review, 40*, 240–246.

Williamson, O. E. (1975). *Markets and hierarchies: Analysis and antitrust implications.* New York: Free Press.

Williamson, O. E. (1991). Comparative economic organizations: The analysis of discrete structural alternatives. *Administrative Science Quarterly, 36*, 269–296.

Wilson, D. & Collier, D. (2000, Spring). An empirical investigation of the Malcolm Baldrige National Quality Award causal model. *Decision Sciences, 31(2),* 361–390.

Wilson, M. (1996). *Managing across cultures.* Greensboro, NC: Center for Creative Leadership.

Winn, B. (1996). *Organizational quality in higher education: An examination of the Baldrige framework in the university work environment. Dissertation Abstracts International.* 57(03A): 970. .

Winn, B. A., & Cameron, K. S. (1998). Organizational quality: An examination of the Malcolm Baldrige National Quality Framework. *Research in Higher Education, 39,* 491–512.

Winter, S. G. (1987). Knowledge and competence as strategic assets. In D. Teece (Ed.), *The competitive challenge—Strategies for industrial innovation and renewal* (pp. 159–184). Cambridge, MA: Ballinger.

Wong, K. K. (2003). Federal Title I as a reform strategy in urban schools. In L. Miron & E. St. John (Eds), *Reinterpreting urban school reform* (pp. 55–76). Albany: State University of New York.

Yun, G. W., Yun, G., & Trumbo, C. W. (2000). Comparative response to a survey executed by post, e-mail, and Web form. *Journal of Computer-Mediated Communication, 6*(1), 0-0.

Zhao, C. M. (2003). *Summary of the discussion on neutral in survey.* Retrieved November 2, 2007, from Overseas Chinese Association for Institutional Research Web site: http://www.ocair.org/files/knowledgebase/Statistics/diss_neutral.pdf

APPENDICES

Appendix A: 2006 Baldrige in Education Criteria

Education criteria (total points: 1,000)	Point values
Leadership (120 points)	
1. Organizational leadership	**70**
2. Social responsibility	**50**
Core values:	
• **Visionary leadership:** "Leaders set direction to create a student focused learning-oriented climate, clear and visible values and high expectations" (NIST 2006, p. 1).	
• **Learning-centered education:** "To develop the fullest potential of all students, education organizations need to afford them opportunities to pursue a variety of avenues to success.... A learning-centered education supports this goal by placing the focus of education on learning and the real needs of students. Such needs derive from market and citizenship requirements" (NIST 2006, p. 1).	
Strategic and Operational Planning (85 points)	
1. Strategy development	**40**
2. Strategy deployment	**45**
Core values:	
• **Focus on the future:** "A focus on the future requires understanding the short- and longer-term factors that affect your organization and the education market" (NIST 2006, p. 2).	
Student, Stakeholder, and Market Focus (85 points)	
1. Student, stakeholder, and market knowledge	**40**
2. Student and stakeholder relationships and satisfaction	**45**
Core values:	
• **Agility**: "Is an increasingly important measure of your organizational effectiveness. It requires a capacity for faster and more flexible response to the needs of your students, and stakeholders" (NIST 2006, p. 3).	
• **Managing for innovation**: "Means making meaningful	

change to improve an organization's programs, services, and processes and to create new value for the organization's stakeholders. Innovation should lead the organization to new dimensions of performance" (NIST 2006, p. 4).	
Measurement, Analysis, Knowledge Management (90 points) **1.** Measurement and analysis of organizational performance **2.** Information and knowledge management **Core values:** • **Management by fact:** "Organizations depend on the measurement and analysis of performance. Such measurements should derive from the organization's needs and strategy, and they should provide critical data and information about key processes and results" (NIST 2006, p. 4).	**45** **45**
Faculty and Staff Focus (85 points) 1. Work systems 2. Faculty and staff learning and motivation 3. Faculty and staff well being and satisfaction **Core values:** • **Organizational and personal learning:** Requires a well-educated approach to organizational and personal learning. Organizational learning includes both "continuous improvement of existing approaches and adaptation to change, leading to new goals and/or approaches" (NIST 2006, p. 2). • **Valuing faculty, staff, and partners:** Means commitment to (staff and faculty) development and well-being. Increasingly, this involves "more flexible, high-performance work practices tailored to faculty and staff with diverse workplace and home life needs" (NIST 2006, p. 3).	**35** **25** **25**

Process Management (85 points)	
1. Learning-centered processes	**50**
2. Support processes	**35**
Core values:	
• **Systems perspective:** The Baldrige criteria provide a systems perspective for managing your organization and its key processes to achieve results-performance excellence. The seven Baldrige categories and the core values form the building blocks and the integrating mechanism for the system. However, successful management of overall performance requires organization-specific synthesis, alignment, and integration. Synthesis means looking at your organization as a whole and builds upon key education requirements, including your strategic objectives and action plans. Alignment means using the key linkages among requirements given in the Baldrige Categories to ensure consistency of plans, processes, measures, and actions. "Integration builds on alignment so that the individual components of your performance management system operate in a fully interconnected manner" (NIST 2006, p. 5).	

Appendix B: Definitions of Key Terms

Absorptive Capacity—The ability of individuals and organizations to recognize the value of new, external information, assimilate it, and apply it to achieve results.

Ambivalence—Ambivalence occurs through rhetoric and action and is the way implementers show conditional acceptance of policy or change.

Balanced Scorecard—A measurement and management system or tool that enables organizations to clarify their vision and strategy and translate them into action. A balanced scorecard provides feedback around both internal business processes and external outcomes in order to continuously improve strategic performance and results.

Benchmarking—The search for industry wide best practices that lead to superior performance. A study of similar organizations to see how things are done best in order to adapt these methods for an organization's own use.

Best Practice—An improvement in a particular process, approach, technique, or subject matter knowledge that is good enough to replace an existing practice and general enough to merit being disseminated widely throughout an organization.

Bounded Rationality—Refers to the limits of cognitive ability possessed by individuals related to decision making. Boundedly rational individuals have limits to their abilities for formulating and solving complex problems because they do not know the probabilities of outcomes, cannot usually evaluate all outcomes with sufficient precision, and sometimes have faulty memory.

Closed System—A system that incorporates only those variables positively associated with goal achievement.

Codification Costs—Costs incurred in rendering tacit knowledge explicit.

Community of Practice (CoP) —An affinity group or information network that provides a forum where members can exchange tips and generate ideas; a group of professionals who try to face and solve common problems and who strive to improve their profession and thereby themselves. A group of practitioners held together by shared practices and common beliefs.

Continuous Improvement—A term commonly used in quality management systems. It refers to an organization's deliberate and planned processes to improve performance.

Coordination—The harmonization of all of the activity and elements within an organization.

Coproduction—Refers to services that are jointly produced, in this case by both teacher and student.

Culture—A people's ways of being, knowing, and doing; all the knowledge and values shared by a cohesive group or organization; the attitudes and behavior characteristics of a particular social group or organization.

Data—Directly observable or directly verifiable facts; the most basic unit of knowledge.

Diffusion Costs—Costs incurred in the dissemination and distribution or publishing of knowledge.

Double-Loop Learning—The questioning and reconstruction of existing perspectives, interpretive frameworks, or decision premises.

Explicit Knowledge—Knowledge that has been rendered visible, usually through transcription into a document, recording, or visual image; captured and codified knowledge.

Externalization—The conversion of tacit knowledge into explicit knowledge; rendering previously unarticulated, undocumented, uncaptured content into a visible, tangible, and concrete form.

Heuristic—A set of instructions for searching out an unknown goal by exploration, which continuously or repeatedly evaluates progress, according to some known criterion. General rules or guidelines, without prescribing a specific route to the goal.

Information—Analyzed data; facts that have been organized to give them meaning.

Internalization—The conversion of explicit knowledge into tacit knowledge; understanding of new knowledge and its integration into existing mental models by accepting that the new knowledge is valuable and actionable.

Knowledge—Information that has been validated and then organized into a mental model.

Knowledge Broker—A person who facilitates the creation, sharing, and use of knowledge in an organization.

Knowledge Management—The deliberate and systematic coordination of an organization's people, technology, processes, and organizational structure in order to add value through reuse and innovation. Value is achieved through the processes of creating, sharing, and applying knowledge as well as recording valuable lessons learned and best practices into the organizational memory.

Knowledge Worker—Term coined by Peter Drucker to refer to professionals who create, modify, and/or synthesize knowledge as a part of their jobs.

Learning Organization—An organization that possesses the practices, systems, and culture that actively promotes sharing of experiences and lessons learned to encourage quality performance and continuous improvement.

Mental Model—An individual's existing understanding and interpretation of a given concept, which is formed and reformed on the basis of experiences, beliefs, values, sociocultural histories, and prior perceptions.

Multiple Division—A type of organizational design that ensures that activities are divisible into relatively independent bundles of activity with a central guidance group that is supported by an analytical staff and includes an interdivisional comparison for purposes of evaluating the performance divisions.

Mutual Adjustment—Involves individuals modifying their behavior and actions in response to others in order to achieve a stated and mutually agreed-upon purpose.

Nonverbal Communication—Communication that takes place without talking by using gestures, expression, observation, silence, etc.

Open System—A system that incorporates uncertainty by recognizing organizational interdependence with the environment.

Organizational Knowledge—A complex network of knowledge and knowledge sets held by an organization, consisting of declarative and procedural rules.

Organizational Learning—The ability of an organization to learn from past behavior and information and to improve as a result; the capture and use of organizational knowledge to improve the efficiency and effectiveness of organizational decision making.

Organizational Memory—All the information, data, and know-how that a company possesses; accumulation of historical events and experiences. The knowledge and understanding embedded in an organization's people, processes, and products or services, along with its traditions and values. Organizational memory can either assist or inhibit an organization's progress.

Satisficing—Behavior adopted in an attempt to achieve at least some level of a particular variable that is less than maximal. Satisficing is based on the criteria of what is sufficient given some limitations that prevent maximization.

Stakeholders—The general public, students, and teachers who are the internal and external customers of an organization.

Stickiness—The difficulty in transferring knowledge. Stickiness reflects the presence of internal factors that inhibit transfer of knowledge and best practice.

Structural Pose—Refers to the variety of roles assumed by an individual in response to a given task and the responsibility of the individual related to the task. Individuals

assume different roles fluidly throughout a day and in relationship/interaction with others.

Tacit Knowledge—From the Latin *tacitare,* which refers to something that is very difficult to articulate, to put into words or images; refers typically to highly internalized knowledge such as how to do a task.

Total Quality Management (TQM)—This is a general process framework that grew out of the work of Deming in Japan after WWII. The framework is focused on specifying the processes necessary to ensure incremental process improvement. Unlike most process frameworks, this one also provides a large number of intellectual tools to be used during process improvement and it also defines some processes in considerable detail.

Appendix C: IRB Approval Letter

UNIVERSITY OF ALASKA FAIRBANKS

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Institutional Review Board

909 N Koyukuk Dr. Suite 212, P.O. Box 757270, Fairbanks, Alaska 99775-7270

April 23, 2007

To: Eric Madsen, Ph.D. Principal Investigator

From: Bridget Stockdale, Research Integrity Administrator Office of Research Integrity

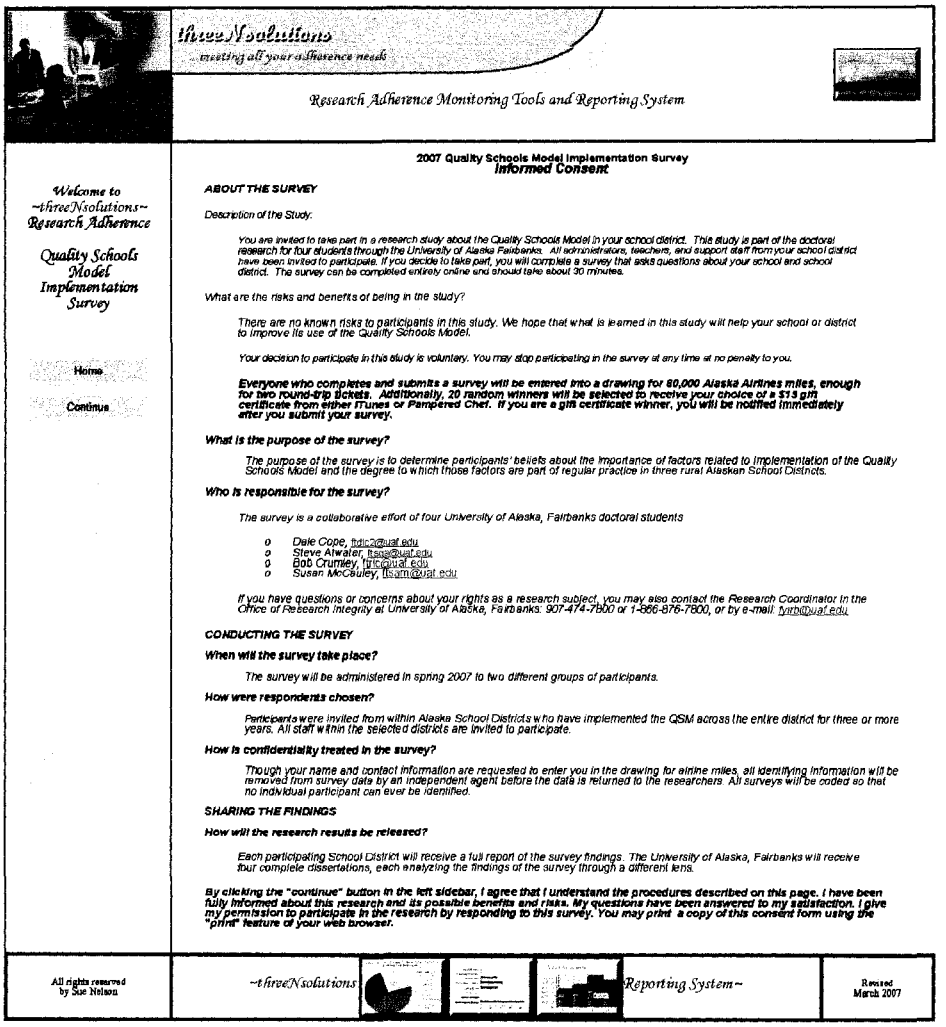
Re: IRB Protocol Application

Thank you for submitting the IRB protocol application identified below. I have administratively reviewed this protocol and determined that it meets the requirements specified in federal regulation for exempt research under 45 CFR 46.101(b)(2). Therefore, I am pleased to inform you that your protocol has been approved. .

Protocol #:	07-16
Title:	*Beliefs and Practices Related to the Quality Schools Model in Alaska*
Level:	Exempt
Received:	March 21, 2007 (orig) April 22, 2007 (rev)
Approved:	April 22, 2007

Exempt research does not require annual continuing review, but please submit any modifications or changes to this protocol to fyirb@uaf.edu for administrative review. Modification Request Forms are available on the IRB website (http://www.uaf.edu/irb/Forms.htm). Please contact the Office of Research Integrity if you have any questions regarding IRB policies or procedures.

Appendix D: Quality Schools Model Questionnaire



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Quality Schools Model Implementation Survey

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2007 Quality Schools Model Implementation Survey
Informed Consent

ABOUT THE SURVEY

Description of the Study:

You are invited to take part in a research study about the Quality Schools Model in your school district. This study is part of the doctoral research for four students through the University of Alaska Fairbanks. All administrators, teachers, and support staff from your school district have been invited to participate. If you decide to take part, you will complete a survey that asks questions about your school and school district. The survey can be completed entirely online and should take about 30 minutes.

What are the risks and benefits of being in the study?

There are no known risks to participants in this study. We hope that what is learned in this study will help your school or district to improve its use of the Quality Schools Model.

Your decision to participate in this study is voluntary. You may stop participating in the survey at any time at no penalty to you.

Everyone who completes and submits a survey will be entered into a drawing for 50,000 Alaska Airlines miles, enough for two round-trip tickets. Additionally, 20 random winners will be selected to receive your choice of a $1.3 gift certificate from either iTunes or Pampered Chef. If you are a gift certificate winner, you will be notified immediately after you submit your survey.

What is the purpose of the survey?

The purpose of the survey is to determine participants' beliefs about the importance of factors related to implementation of the Quality Schools Model and the degree to which those factors are part of regular practice in three rural Alaskan School Districts.

Who is responsible for the survey?

The survey is a collaborative effort of four University of Alaska, Fairbanks doctoral students

- *Dale Cope, fndic2@uaf.edu*
- *Steve Atwater, fnsa@uaf.edu*
- *Bob Crumley, fjrc@uaf.edu*
- *Susan McCauley, fjsm@uaf.edu*

If you have questions or concerns about your rights as a research subject, you may also contact the Research Coordinator in the Office of Research Integrity at University of Alaska, Fairbanks: 907-474-7900 or 1-866-876-7800, or by e-mail: fyrb@uaf.edu

CONDUCTING THE SURVEY

When will the survey take place?

The survey will be administered in spring 2007 to two different groups of participants.

How were respondents chosen?

Participants were invited from within Alaska School Districts who have implemented the QSM across the entire district for three or more years. All staff within the selected districts are invited to participate.

How is confidentiality treated in the survey?

Though your name and contact information are requested to enter you in the drawing for airline miles, all identifying information will be removed from survey data by an independent agent before the data is returned to the researchers. All surveys will be coded so that no individual participant can ever be identified.

SHARING THE FINDINGS

How will the research results be released?

Each participating School District will receive a full report of the survey findings. The University of Alaska, Fairbanks will receive four complete dissertations, each analyzing the findings of the survey through a different lens.

By clicking the "continue" button in the left sidebar, I agree that I understand the procedures described on this page. I have been fully informed about this research and its possible benefits and risks. My questions have been answered to my satisfaction. I give my permission to participate in the research by responding to this survey. You may print a copy of this consent form using the "print" feature of your web browser.

~threeNsolutions Reporting System~

Revised March 2007

The Quality Schools Model
Survey Directions

There are 72 statements in the survey. For each statement, you should mark a response in the column on the *left* of the question, and mark another response in the column on the *right* of the question.

The column on the left is to record the "*Degree to which I believe & agree that this is important*", and the column on the right is to record the "*Degree to which I see this in practice in my district*". For each statement, there are four response choices.

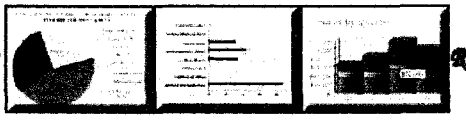
When you complete the questions on each page, click the "Next" button to continue. Each page is numbered so you can note your progress through the survey. Following the survey items, there are some questions about your job title, years of teaching, etc. (these are the survey *demographics).*

Once you've completed the survey items and the demographic section, the last step is to provide your name and contact information to be eligible for a drawing for 60,000 Alaska Airlines miles – our way of saying thanks for taking the time to provide us with your thoughtful responses.

Also, random survey participants will win your choice of either an i-Tunes or *Pampered Chef* gift card worth $15. Gift card winners will be notified immediately.

Be assured that the identifying information such as your name and address will be disassociated from your survey responses before the information is returned to the researchers.

[BEGIN SURVEY]



Belief: Degree to which I believe and agree that this is important				**Statement**	**Practice:** Degree to which I see this in practice in my district			
Strongly Disagree	Disagree	Agree	Strongly Agree		Never	Occas-ionally	Freq-uently	Always
				one answer from each group is required before going on to the next page **IF YOU LOG OUT OF THE SURVEY, YOU MUST START OVER AT THE BEGINNING**				
☐	☐	☐	☐	1. Our district builds relationships with colleges, universities, vocational schools and other post-graduation training programs to help students transition from high school.	☐	☐	☐	☐
☐	☐	☐	☐	2. District leadership provides for staff and stakeholders to have input into the values, directions, and performance expectations of our school district.	☐	☐	☐	☐
☐	☐	☐	☐	3. Our district plans effectively for transitions of personnel into leadership positions.	☐	☐	☐	☐
☐	☐	☐	☐	4. Our district has an effective training program in continuous improvement as part of our new employee orientation.	☐	☐	☐	☐
☐	☐	☐	☐	5. Our personnel and human resource services operate efficiently and make a positive contribution to our school district's quality goals.	☐	☐	☐	☐
☐	☐	☐	☐	6. Our district has a set way to use information from multiple sources to achieve better performance.	☐	☐	☐	☐
☐	☐	☐	☐	7. We revise and change the types of performance data we collect as our needs and directions change.	☐	☐	☐	☐
☐	☐	☐	☐	8. District leadership requires legal and ethical behavior from themselves, staff, and students.	☐	☐	☐	☐
☐	☐	☐	☐	9. Faculty and staff are asked to identify the areas in which they would like to receive professional development.	☐	☐	☐	☐
☐	☐	☐	☐	10. Before we develop anything new, we assure that it will be of a higher quality than what we currently are doing.	☐	☐	☐	☐
☐	☐	☐	☐	11. Our schools continually evaluate how we determine the educational needs of our students.	☐	☐	☐	☐
☐	☐	☐	☐	12. Our district has steps in place to assure that instructional services are of high quality.	☐	☐	☐	☐
☐	☐	☐	☐	13. Our schools have data than enables us to monitor trends in the levels of student/family satisfaction over the past three years.	☐	☐	☐	☐

CONTINUE SURVEY

~ threeNsolutions

Belief: Degree to which I believe and agree that this is important				**Statement**	**Practice:** Degree to which I see this in practice in my district			
Strongly Disagree	Disagree	Agree	Strongly Agree		Never	Occasionally	Frequently	Always
				14. Systems are in place to train and educate faculty and staff to achieve district goals.				
				15. Our district keeps up with changing national, state, or local requirements.				
				16. Information is provided to me so that I know how resources are allocated to achieve our goals.				
				17. Our district measures staff learning and development in areas such as collaboration, and knowledge/skill sharing.				
				18. Our school district uses information about student learning needs to design new instructional services.				
				19. Our district can document that our quality measurements examine the most important factors that predict gains in student learning and student/family satisfaction.				
				20. District and school staff can quickly get information they need to make improvements in their work.				
				21. Our district has a set way to gather information on our students' needs.				
				22. Our district's performance is analyzed and the data is used in the strategic plan to improve our district.				
				23. Our district gathers information from former students and/or their parents for continuous improvement.				
				24. Our school district's strategic plan is based upon an analysis of a variety of data.				
				25. Performance review results are analyzed and used to improve district leadership and staff performance.				
				26. In general, parents are increasingly supportive of the professional staff and support staff of the school district.				

CONTINUE SURVEY

~ threeNsolutions

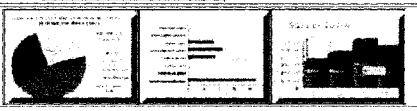
Belief: Degree to which I believe and agree that this is important				**Statement**	**Practice:** Degree to which I see this in practice in my district			
Strongly Disagree	Disagree	Agree	Strongly Agree		Never	Occasionally	Frequently	Always
				one answer from each group is required before going on to the next page				
				IF YOU LOG OUT OF THE SURVEY, YOU MUST START OVER AT THE BEGINNING				
☐	☐	☐	☐	27. Our district ensures that software and hardware systems (computers, internet, networks) are current with our district's needs.	☐	☐	☐	☐
☐	☐	☐	☐	28. I know how well our students are performing compared to similar schools.	☐	☐	☐	☐
☐	☐	☐	☐	29. Our district provides a computerized data management system for staff to utilize.	☐	☐	☐	☐
☐	☐	☐	☐	30. Our district regularly reviews and analyzes student learning and then creates processes that improves student success.	☐	☐	☐	☐
☐	☐	☐	☐	31. District leadership works to ensure that everyone knows what is going on.	☐	☐	☐	☐
☐	☐	☐	☐	32. District leadership regularly communicates to the staff and community about the importance of student/family satisfaction.	☐	☐	☐	☐
☐	☐	☐	☐	33. Students and staff provide input for key non-instructional services.	☐	☐	☐	☐
☐	☐	☐	☐	34. Our district involves staff and other stakeholders in improving the strategic planning process.	☐	☐	☐	☐
☐	☐	☐	☐	35. Our schools have procedures in place to assure that student/family complaints are resolved effectively and promptly.	☐	☐	☐	☐
☐	☐	☐	☐	36. Our district makes it easy for students, parents, and stakeholders to comment on the school district programs or services.	☐	☐	☐	☐
☐	☐	☐	☐	37. Our schools regularly initiate contact with parents and students to assess the levels of satisfaction with the schools.	☐	☐	☐	☐
☐	☐	☐	☐	38. Our school district's strategic plan addresses ways to significantly improve student learning and a student/family focus.	☐	☐	☐	☐
☐	☐	☐	☐	39. Stable and consistent district leadership helps lead toward successful QSM implementation.	☐	☐	☐	☐

CONTINUE SURVEY

~ threeNsolutions

Belief: Degree to which I believe and agree that this is important				**Statement**	**Practice:** Degree to which I see this in practice in my district			
Strongly Disagree	Disagree	Agree	Strongly Agree		Never	Occasionally	Frequently	Always
				one answer from each group is required before going on to the next page IF YOU LOG OUT OF THE SURVEY, YOU MUST START OVER AT THE BEGINNING				
☐	☐	☐	☐	40. This district has effective ways to communicate important information to students.	☐	☐	☐	☐
☐	☐	☐	☐	41. Our district will change or redesign programs and offerings in order to improve student achievement.	☐	☐	☐	☐
☐	☐	☐	☐	42. District leadership does more than just talk about quality; they are very much involved in making it happen.	☐	☐	☐	☐
☐	☐	☐	☐	43. Our district tracks staff well-being, satisfaction, and development and continuously improves these areas.	☐	☐	☐	☐
☐	☐	☐	☐	44. Information about best practices is collected and shared among staff members.	☐	☐	☐	☐
☐	☐	☐	☐	45. Our district has a written shared vision which is communicated with all staff and students.	☐	☐	☐	☐
☐	☐	☐	☐	46. School staff are adequately prepared to handle disasters and emergencies.	☐	☐	☐	☐
☐	☐	☐	☐	47. District leadership guides the district to practice good citizenship.	☐	☐	☐	☐
☐	☐	☐	☐	48. District leadership regularly communicates to the staff and community about the importance of quality in our system.	☐	☐	☐	☐
☐	☐	☐	☐	49. District leadership is trusted by students, staff, and community.	☐	☐	☐	☐
☐	☐	☐	☐	50. Our district encourages faculty and staff to be involved in district-level decision making.	☐	☐	☐	☐
☐	☐	☐	☐	51. Staff members are given prompt positive feedback when they make contributions to school district quality.	☐	☐	☐	☐
☐	☐	☐	☐	52. The quality data our district gathers covers a broad scope and comes from a variety of sources.	☐	☐	☐	☐

CONTINUE SURVEY



Belief: Degree to which I believe and agree that this is important				**Statement**	**Practice:** Degree to which I see this in practice in my district			
Strongly Disagree	Disagree	Agree	Strongly Agree		Never	Occa-- ionally	Freq- uently	Always
				53. Our district has a realistic timeline for achieving important goals and objectives.				
				54. Our district explains the overall strategic planning process to staff and students so that everyone knows the performance requirements.				
				55. Our district recruits, hires, and retains the best possible faculty and staff.				
				56. Our district's strategic plan is reviewed on a continuous basis by various levels of staff and translated into individual performance plans.				
				57. The student/family data we collect is translated into solutions to student/family problems.				
				58. Our district uses information gathered from our students to improve instructional services.				
				59. Our district use comparisons with similar school districts to guide the improvement of quality and to improve instructional services.				
				60. Our district regularly assesses the satisfaction levels of staff members.				
				61. Our district uses information from multiple sources when designing non-instructional services.				
				62. Our non-instructional services have performance measures that are analyzed to improve these services.				
				63. District leadership creates conditions for ongoing staff learning.				
				64. Our business/finance services operate efficiently and make a positive contribution to the district's quality goals.				
				65. Our district assesses the effectiveness of our training programs for staff members.				

one answer from each group is required before going on to the next page

IF YOU LOG OUT OF THE SURVEY, YOU MUST START OVER AT THE BEGINNING

CONTINUE SURVEY

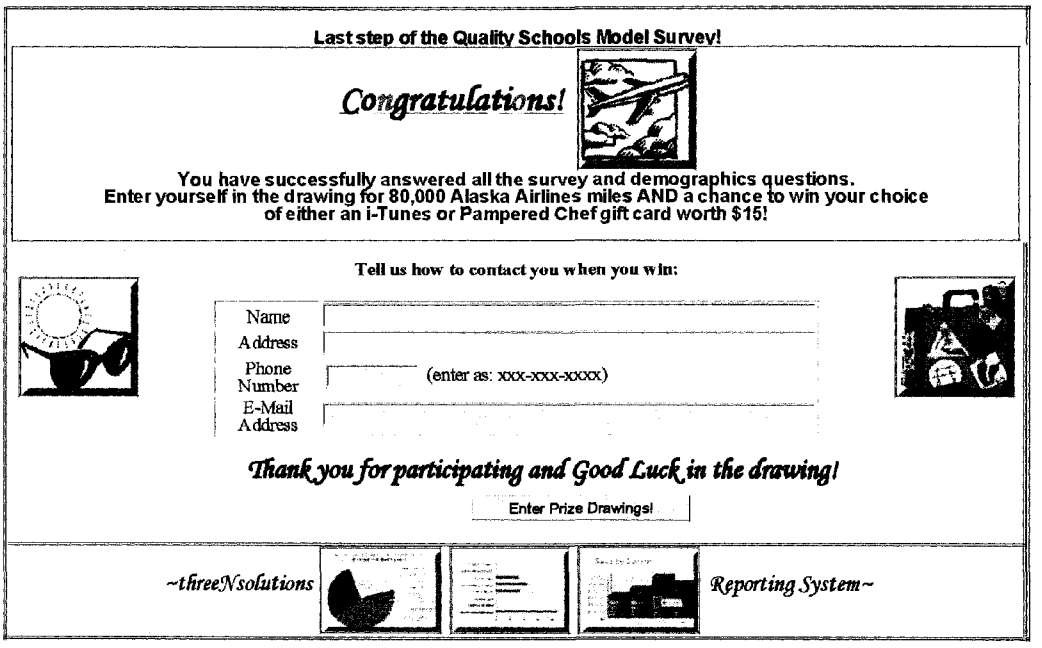
~ *threeNsolutions*

Belief: Degree to which I believe and agree that this is important				Statement	Practice: Degree to which I see this in practice in my district			
Strongly Disagree	Disagree	Agree	Strongly Agree	**one answer from each group is required before going on to the next page IF YOU LOG OUT OF THE SURVEY, YOU MUST START OVER AT THE BEGINNING	Never	Occasionally	Frequently	Always
☐	☐	☐	☐	66. District leadership works to develop the future leaders of our district.	☐	☐	☐	☐
☐	☐	☐	☐	67. Our district has a way to determine basic student needs based on their career interests, learning styles, family needs, etc.	☐	☐	☐	☐
☐	☐	☐	☐	68. Our staff effectively communicates and shares knowledge and skills across our departments, jobs, and locations.	☐	☐	☐	☐
☐	☐	☐	☐	69. Our student/family support services (e.g. counseling services, health services) operate efficiently and make a positive contribution to our school district's quality goals.	☐	☐	☐	☐
☐	☐	☐	☐	70. Our district leadership works ethically, transparently, and is trusted by students, staff, and communities.	☐	☐	☐	☐
☐	☐	☐	☐	71. When our schools review our student/family satisfaction results, they are able to break the data into appropriate groups.	☐	☐	☐	☐
☐	☐	☐	☐	72. Our district leadership consistently emphasizes a focus on student learning when communicating to staff members.	☐	☐	☐	☐

Demographic Questions

1. School District	Lake & Peninsula Kuspuk Bering Strait Chugach
2. Gender	Male Female
3. What is your job classification	Classified-classroom based Classified-non-instructional Teacher Administrator
4. Total years of Education Work Experience	First Year 1 to 3 Years 4 to 7 Years 7 to 10 Years 11 to 15 years more than 15 years
5. Years of Experience in your current district	First Year 1 to 3 Years 4 to 7 Years 7 to 10 Years 11 to 15 years more than 15 years
6. Years of Experience with the Quality School Model	First Year 1 to 3 Years 4 to 7 Years 7 to 10 Years
7. Have you participated in a school reform effort in another district	Yes No
7a) If so, how successful did you consider it to be	Not Applicable Very Successful Partially Successful Not Successful

ENTER DRAWING!


Last step of the Quality Schools Model Survey!
Congratulations!
You have successfully answered all the survey and demographics questions.
Enter yourself in the drawing for 80,000 Alaska Airlines miles AND a chance to win your choice of either an i-Tunes or Pampered Chef gift card worth $15!
Tell us how to contact you when you win:
Name
Address
Phone Number
(enter as: xxx-xxx-xxxx)
E-Mail Address
Thank you for participating and Good Luck in the drawing!
Enter Prize Drawings!
~threeNsolutions
Reporting System~

DrawingConfirmation

Survey Completion Confirmation

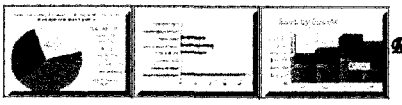
Congratulations!

You have successfully completed the Quality Schools Model Survey and your name has been entered in the Alaska Airlines miles drawing.

The winner will be drawn on May 15, 2007 and will be notified by June 1, 2007.

Thank-you!

Click here to exit this survey.

threeNsolutions  ***Reporting System~***

Revised March 2007

Appendix E: Interview Informed Consent and Protocol

Informed Consent Form for Interview

IRB #: 07-16 **Date: Approved: April 22, 2007**

Description of the Study:

You are being asked to take part in a research study about the school in your community. We are conducting this study as part of our college work at University of Alaska Fairbanks. As part of that study, we are interviewing some staff and community members. You are being asked to participate because the principal in your village said that you are someone who knows about the school. Please read this form and ask any questions you may have before you agree to be in the study.

If you decide to take part, you will be asked some questions about the school in your community. The interview should take about 45 minutes.

Risks and Benefits of Being in the Study:

There are no known risks to you for participating. We hope that what is learned in this study will help your school or district to improve.

Confidentiality:

Your answers to the questions will be kept anonymous. We will not ask for your name.

Voluntary Participation:

It is up to you to decide if you want to participate in the interview. You may say that you don't want to, or you may stop taking part at any time.

Contact Information:

If you have questions about the interview, please contact one of the researchers listed below.

Steve Atwater ftsga@uaf.edu	Susan McCauley ftsam@uaf.edu
Bob Crumley ftrlc@uaf.edu	Dale Cope ftdlc2@uaf.edu

If you have questions or concerns about your rights as a research subject, please contact the Research Coordinator in the Office of Research Integrity at University of Alaska, Fairbanks: (907) 474-7800 or (1-800) 876-7800, or by e-mail: fyirb@uaf.edu

SIGNATURE AND CONSENT TO PARTICIPATE:

Federal law and University regulations require that we obtain signed consent for participation in research projects involving human subjects. After you have read this project's purpose, procedures, benefits, and risks, please indicate your consent by signing the attached statement.

I have been fully informed of the above described research and its possible benefits and risks. My questions have been answered to my satisfaction. I have been provided with a copy of this consent form, and I give my permission to participate in the research by responding to this survey.

Name: _____

(please print)

Signature:_____

Date:_____

Implementation of the Quality Schools Model

Interview Protocol

Interviewer Name _____Interview Date _____

Name of Person Interviewed _____ District: LPSD KSD BSSD

Introduction: "I am studying how education and your school district may have changed in the last few years since starting to implement the Quality Schools Model. The questions I'm asking you today all have to do with education and the Quality Schools Model. I'm interested in your beliefs and opinions and really appreciate your time today. Everything you tell me today will be kept confidential, and you will not be identified personally in the results of this research. This interview should take approximately 45 minutes. I would like to record notes while we are talking. Is that alright with you?"

1. What do you know about the Quality Schools Model?
2. Is the Quality Schools Model important to you?
3. What is working best with the Quality Schools Model?
4. What could be improved with the Quality Schools Model in your district?
5. What recommendations or suggestions do you have for improving the Quality Schools Model?

Appendix F: CFA Results for Individual Factors

Table E.1 Maximum-Likelihood Parameter Estimates for the Leadership Factor

Variable			B	*SE*	*p*	β	R^2
66	<---	Leadership	.530	.049	***	.679	.461
72	<---	Leadership	.468	.045	***	.660	.436
63	<---	Leadership	.583	.048	***	.745	.555
47	<---	Leadership	-.606	.033	***	.679	.462
49	<---	Leadership	.561	.052	***	.668	.447
42	<---	Leadership	.537	.051	***	.779	.575
39	<---	Leadership	.627	.048	***	.775	.606
31	<---	Leadership	.605	.047	***	.758	.601
8	<---	Leadership	.633	.050	***	.519	.269

$\chi^2/df = 1.476$
RMR = .020
RMSEA = .047
CFI = .984
GFI = .964

Table E.2 Standardized Residual Covariances for the Leadership Factor

	8	39	42	31	49	47	63	72	66
8	.000								
39	-.705	.000							
42	.413	.348	.000						
31	.421	.098	-.219	.000					
49	-.140	-.019	-.425	.749	.000				
47	.807	-.235	-.526	-.876	1.263	.000			
63	-.260	.254	.080	.050	-.898	.193	.000		
72	-.057	-.142	.431	.019	-.181	-.364	.169	.000	
66	-.428	-.289	-.032	.050	-.176	.918	.045	-.155	.000

Table E.3 Maximum-Likelihood Parameter Estimates for the Staff Focus Factor

Variable			B	*SE*	*p*	β	R^2
51	<---	Staff Focus	.554	.055	***	.663	.439
55	<---	Staff Focus	.410	.051	***	.550	.302
14	<---	Staff Focus	.500	.050	***	.657	.432
4	<---	Staff Focus	.516	.057	***	.606	.368
9	<---	Staff Focus	.565	.055	***	.666	.443
50	<---	Staff Focus	.600	.055	***	.705	.500
65	<---	Staff Focus	.591	.053	***	.707	.497
68	<---	Staff Focus	.467	.055	***	.578	.334

$\chi^2/df = 2.026$
RMR = .028
RMSEA = .070
CFI = .961
GFI = .954

Table E.4 Standardized Residual Covariances for the Staff Focus Factor

	68	50	65	9	4	14	55	51
68	.000							
50	-.619	.000						
65	.067	-.116	.000					
9	-.098	.029	.643	.000				
4	-.196	-.700	-.346	.671	.000			
14	.360	-.286	.509	-.664	1.757	.000		
55	.245	.975	-.299	-.862	-.770	-.695	.000	
51	.404	.763	-.585	-.072	-.497	-.816	1.188	.000

Table E.5 Maximum-Likelihood Parameter Estimates for the Knowledge Management Factor

Variable			B	*SE*	*p*	β	R^2
25	<---	Knowledge Management	.588	.055	***	.683	.466
22	<---	Knowledge Management	.512	.047	***	.688	.473
40	<---	Knowledge Management	.489	.049	***	.648	.420
57	<---	Knowledge Management	.638	.052	***	.748	.559
52	<---	Knowledge Management	.614	.047	***	.789	.623
59	<---	Knowledge Management	.525	.050	***	.675	.489
20	<---	Knowledge Management	.578	.052	***	.700	.456
7	<---	Knowledge Management	.433	.048	***	.578	.358

$\chi^2/df = 2.066$
RMR = .023
RMSEA = .071
CFI = .969
GFI = .955

Table E.6 Standardized Residual Covariances for the Knowledge Management Factor

	7	59	20	52	57	40	22	25
7	.000							
59	.647	.000						
20	-.519	-.010	.000					
52	.301	-.069	-.531	.000				
57	.055	.616	.132	.024	.000			
40	-.627	-.916	.661	.361	.754	.000		
22	.295	.146	.478	.134	-1.403	-.533	.000	
25	-.406	-.523	.036	-.057	-.036	-.453	1.266	.000

Table E.7 Maximum-Likelihood Parameter Estimates for the Process Management Factor

Variable			B	*SE*	*p*	β	R^2
21	<---	Process Management	.468	.050	***	.608	.370
12	<---	Process Management	.516	.048	***	.685	.470
18	<---	Process Management	.668	.048	***	.813	.661
61	<---	Process Management	.562	.051	***	.698	.487
41	<---	Process Management	.578	.050	***	.719	.517
58	<---	Process Management	.600	.050	***	.741	.425
10	<---	Process Management	.518	.051	***	.652	.549
6	<---	Process Management	.496	.049	***	.648	.420

$\chi^2/df = 2.485$
RMR = .026
RMSEA = .084
CFI = .958
GFI = .947

Table E.8 Standardized Residual Covariances for the Process Management Factor

	6	58	10	41	61	18	12	21
6	.000							
58	-.489	.000						
10	.876	-.362	.000					
41	-.350	.291	.464	.000				
61	.479	.545	-.485	.231	.000			
18	.239	.296	-.809	.024	-.317	.000		
12	.402	-.725	1.697	-.878	-.335	.011	.000	
21	-1.488	-.035	-.622	.146	-.020	.564	.640	.000

Table E.9 Maximum-Likelihood Parameter Estimates for the Results Factor

Variable			B	*SE*	*p*	β	R^2
43	<---	Results	.650	.055	***	.324	.578
26	<---	Results	.448	.054	***	.418	.331
64	<---	Results	.356	.051	***	.406	.246
70	<---	Results	.489	.052	***	.408	.408
69	<---	Results	.557	.059	***	.246	.406
19	<---	Results	.532	.055	***	.331	.418
5	<---	Results	.437	.053	***	.578	.324

$\chi^2/df = 1.715$
RMR = .024
RMSEA = .058
CFI = .973
GFI = .970

Table E.10 Standardized Residual Covariances for the Results Factor

	5	19	69	70	64	26	43
5	.000						
19	.574	.000					
69	-.031	-.527	.000				
70	-1.258	-.389	.264	.000			
64	2.049	-.376	-.181	.227	.000		
26	-.296	.360	-.342	.799	.012	.000	
43	-.169	.239	.394	.200	-.736	-.356	.000

Table E.11 Maximum-Likelihood Parameter Estimates for the Strategic Planning Factor

Variable			B	*SE*	*p*	β	R^2
45	<---	Strategic Planning	.428	.055	***	.535	.286
38	<---	Strategic Planning	.567	.051	***	.713	.508
53	<---	Strategic Planning	.565	.048	***	.735	.540
56	<---	Strategic Planning	.612	.054	***	.722	.521
54	<---	Strategic Planning	.551	.054	***	.664	.441
34	<---	Strategic Planning	.501	.047	***	.684	.468
16	<---	Strategic Planning	.583	.056	***	.674	.455

$\chi^2/df = 2.50$
RMR = .027
RMSEA = .084
CFI = .960
GFI = .956

Table E.12 Standardized Residual Covariances for the Strategic Planning Factor

	16	34	54	56	53	38	45
16	.000						
34	-.431	.000					
54	-.828	-.522	.000				
56	-.750	.251	.596	.000			
53	.513	.192	.518	.203	.000		
38	1.371	.243	-.198	-.663	-.635	.000	
45	-.227	.138	.327	.747	-1.213	.370	.000

Table E.13 Maximum-Likelihood Parameter Estimates for the Student, Stakeholder and Market Focus Factor

Variable			B	*SE*	*p*	β	R^2
15	<---	Student, Stakeholder, and Market Focus	.374	.048	***	.531	.282
13	<---	Student, Stakeholder, and Market Focus	.526	.060	***	.594	.353
23	<---	Student, Stakeholder, and Market Focus	.579	.059	***	.649	.421
36	<---	Student, Stakeholder, and Market Focus	.665	.053	***	.622	.613
35	<---	Student, Stakeholder, and Market Focus	.545	.053	***	.783	.451
37	<---	Student, Stakeholder, and Market Focus	.536	.051	***	.671	.462
1	<---	Student, Stakeholder, and Market Focus	.321	.050	***	.680	.203
67	<---	Student, Stakeholder, and Market Focus	.473	.053	***	.451	.362

$\chi^2/df = 2.199$
RMR = .030
RMSEA = .075
CFI = .951
GFI = .947

Table E.14 Standardized Residual Covariances for the Student, Stakeholder and Market Focus Factor

	67	1	37	35	36	23	13	15
67	.000							
1	.877	.000						
37	-.388	-1.351	.000					
35	-.326	-.226	-.040	.000				
36	-.457	-.204	.930	.883	.000			
23	.307	.559	-.330	-.434	-.407	.000		
13	.692	.830	.263	-1.335	-.593	.550	.000	
15	.543	.277	-.936	.451	-1.046	.988	1.135	.000